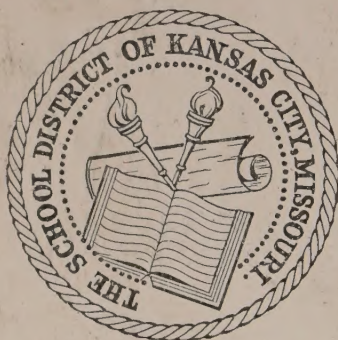


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BULLETIN

(formerly JOURNAL)

OF THE

AMERICAN GEOGRAPHICAL SOCIETY

MDCCCXI



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CONTENTS

	PAGE
List of Officers and Councillors.....	v
Charter of Incorporation.....	vii
Amended Charter.....	ix
By-Laws of the American Geographical Society as amended November 21, 1911.....	xii
Potosí. By PROF. HIRAM BINGHAM	i
Geographic Influences in American Slavery. By F. V. EMERSON.....	13, 106, 170
Railroad Distances in New York. By A. E. PARKINS.....	26
The Spitzbergen Excursion of the International Geological Congress. By PROF. R. S. TARR.....	31
The Rubber Workers of the Amazon. By A. LANGE.....	33
The Economic Importance of the Plateaus in Tropic America. By PROF. J. RUSSELL SMITH.....	36
Notes on the Description of Land Forms. By PROF. W. M. DAVIS.....	46, 190, 598, 679, 847
Charcot's Antarctic Exploration. By EDWIN SWIFT BALCH	81
The Karst Country of Southern Asia Minor. By ELLSWORTH HUNTINGTON.....	91
The Deep Sea. By Sir JOHN MURRAY.....	119
Macquarie Island and its Robinson Crusoe.....	126
The Death Valley Region.....	129
An Extension of the Known Area of Pleistocene Glaciation to the Coast Ranges of California. By RULIFF S. HOLWAY.....	161
Sleeping Sickness in Uganda. By PETER MAC QUEEN.....	181
Exploring the Canadian Northwest.....	185
The Culture of the Nations. By MARK JEFFERSON.....	241
Polynesian Wanderings. A Review. By S. PERCY SMITH.....	265
Regional Peculiarities in Place Names. By R. H. WHITBECK.....	273
Palmer Land. By EDWIN SWIFT BALCH.....	282
Glaciers of Prince William Sound and the Southern Part of the Kenai Penin- sula, Alaska. By U. S. GRANT and D. F. HIGGINS.....	321, 401, 721
The Establishment of Michigan's Boundaries: A Study in Historical Geo- graphy. By GEORGE J. MILLER.....	339
The Hempstead Plains: A Natural Prairie on Long Island. By ROLAND M. HARPER.....	351
Rational Study of Topographic Forms. A Review. By PROF. W. M. DAVIS.....	361
Land Reliefs that are True to Nature. By GEORGE CARROLL CURTIS.....	418
The Economic Climatology of the Coffee District of São Paulo, Brazil. By ROBERT DEC. WARD.....	428
Hudson Land. By EDWIN SWIFT BALCH.....	445
The New Home of the American Geographical Society.....	481
Physiographical Features of Iceland. By W. S. C. RUSSELL.....	489
Rice in the United States. By G. T. SURFACE.....	500
The Peopling of Yap. By WILLIAM CHURCHILL.....	510

	PAGE
Progressive Development of Resources in the Lake Superior Region. By LAWRENCE MARTIN.....	561, 659
A Review of the Waterway Problem. By ROBERT MARSHALL BROWN.....	573
The Discoverer of the Philippines. By JOHN DENISON CHAMPLIN.....	587
Honorary and Corresponding Members and Fellows of the American Geo- graphical Society.....	605
The Pleistocene Glaciation of North America Viewed in the Light of our Knowledge of Existing Continental Glaciers. By WILLIAM HERBERT HOBBS.....	641
Maps of Primitive Peoples. Translated from the Russian and Abridged by H. DE HUTOROWICZ.....	669
The Real New York in 1910. By MARK JEFFERSON.....	737
The Purpose and Position of Geography. By COLONEL C. F. CLOSE.....	740
Foundations of Economic Progress in Tropical Africa. By CYRUS C. ADAMS.....	753
Daylight Observations on Venus. By J. P. AULT.....	767
STEFÁNSSON and ANDERSON in the Canadian Arctic.....	771
Northeastern Chehkiang, China: Notes on Human Adaptation to Environ- ment. By THOMAS GOODCHILD.....	801
Hanging Valleys of the Yosemite. By D. W. JOHNSON.....	826, 890
Explorations in Dutch New Guinea.....	837
August Petermann: A Review. By MARTHA KRUG GENTHE.....	845
Jan Mayen Expedition of 1911. By W. S. C. RUSSELL.....	881
The Eruption of Taal Volcano.....	903
Geographical Record (including Transactions of the American Geographical Society).....	51, 130, 195, 283, 365, 447, 518, 618, 685, 775, 854, 916
Geographical Literature and Maps (including Accessions to the Library).....	61, 139, 205, 295, 373, 455, 531, 625, 693, 781, 863, 923
Book Reviews and Notices.....	61, 139, 205, 295, 373, 455, 531, 625, 693, 781, 863, 923
Current Geographical Papers.....	66, 151, 221, 313, 394, 474, 553, 635, 714, 788, 867, 947
New Maps.....	75, 157, 228, 308, 389, 470, 544, 629, 706, 794, 873, 953
Other Accessions.....	236, 400, 480, 560, 640, 720, 800, 880, 960

AMERICAN GEOGRAPHICAL SOCIETY.

OFFICERS AND COUNCILLORS,

1911.

OFFICERS.

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Terms expire 1914

CHARTER OF INCORPORATION

GRANTED APRIL 13, 1854

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

SECTION I. George Bancroft, Henry Grinnell, Francis L. Hawks, John C. Zimmerman, Archibald Russell, Joshua Leavitt, William C. H. Waddell, Ridley Watts, S. De Witt Bloodgood, M. Dudley Bean, Hiram Barney, Alexander J. Cotheal, Luther B. Wyman, John Jay, J. Calvin Smith, Henry V. Poor, Cambridge Livingston, Edmund Blunt, Alexander W. Bradford, and their associates, who are now or may become hereafter associated for the purposes of this act, are hereby constituted a body corporate by the name of "The American Geographical and Statistical Society," for the purpose of collecting and diffusing geographical and statistical information.

§ 2. For the purposes aforesaid, the said Society shall possess the general powers and privileges, and be subject to the general liabilities, contained in the third title of the eighteenth chapter of the first part of the Revised Statutes, so far as the same may be applicable, and may not have been modified or repealed; but the real and personal estate which the said Society shall be authorized to take, hold, and convey, over and above its library, and maps, charts, instruments, and collections, shall not at any time exceed an amount the clear yearly income of which shall be ten thousand dollars.

§ 3. The officers of said Society shall be a president, three vice-presidents, a corresponding secretary, a recording secretary, a librarian, and a treasurer, and such other officers as may from time to time be provided for by the by-laws of the said Society.

§ 4. The said Society, for fixing the terms of admission of its members, for the government of the same, for changing and altering the officers above named, and for the general regulation and management of its transactions and affairs, shall have power to form a code of by-laws, not inconsistent with the laws of this State, or of the United States, which code, when formed and adopted at a regu-

lar meeting, shall, until modified or rescinded, be equally binding as this act upon the said Society, its officers, and its members.

§ 5. The Legislature may, at any time, alter or repeal this act.

§ 6. This act to take effect immediately.

STATE OF NEW YORK, }
Secretary's Office. } ss.:

I have compared the preceding with the original law on file in this office, and hereby certify the same to be a correct transcript therefrom, and of the whole of said original law.

Given under my hand and seal of office, at the city of Albany, this
[L. s.] thirteenth day of April, one thousand eight hundred and fifty-four.

A. G. JOHNSON,
Deputy Secretary of State.

AMENDED CHARTER

PASSED APRIL 8, 1871

STATE OF NEW YORK, No. 237, IN SENATE. *March 7, 1871.*—
Introduced with unanimous consent, by Mr. Bradley; read twice,
and referred to the Committee on Literature; reported favorably
from said committee, and committed to the Committee of the
Whole.

CHAP. 373

AN ACT in relation to The American Geographical and Statistical
Society.

PASSED April 8, 1871.

*The People of the State of New York represented in Senate and
Assembly, do enact as follows:*

SECTION 1. The name or corporate title of the said Society shall
hereafter be The American Geographical Society of New York.

§ 2. The object of the said Society shall be the advancement
of geographical science; the collection, classification and scientific
arrangement of statistics, and their results; the encouragement of
explorations for the more thorough knowledge of all parts of the
North American continent, and of other parts of the world which
may be imperfectly known; the collection and diffusion of geo-
graphical, statistical and scientific knowledge, by lectures, printed
publications, or other means; the keeping up of a correspondence
with scientific and learned societies in every part of the world, for
the collection and diffusion of information, and the interchange
of books, charts, maps, public reports, documents, and valuable
publications; the permanent establishment in the city of New York
of an institution in which shall be collected, classified, and arranged,
geographical and scientific works, voyages and travels, maps, charts,
globes, instruments, documents, manuscripts, prints, engravings, or
whatever else may be useful or necessary for supplying full, accu-
rate, and reliable information in respect to every part of the globe,
or explanatory of its geography, physical and descriptive; and its
geological history, giving its climatology, its productions, animal,
vegetable, and mineral; its exploration, navigation, and commerce;

having especial reference to that kind of information which should be collected, preserved, and be at all times accessible for public uses in a great maritime and commercial city.

§ 3. The power given by the act hereby accorded to the said Society, to take, hold, convey, manage, and make use of its real and personal estate, shall be understood as authorizing said Society to take and hold by gift, grant, bequest, devise, subject to all provisions of law relative to devises and bequests by last will and testament, or purchase real estate to the value of three hundred thousand dollars, and to invest its income, or its personal estate generally, so as to produce a regular annual income sufficient for the accomplishment of the purposes set forth in the first section of this act; but said annual income shall not exceed twenty-five thousand dollars annually.

§ 4. The said Society shall make an annual report of its proceedings to the Legislature.

STATE OF NEW YORK, }
Office of Secretary of State. } ss.:

I have compared the preceding with the original law on file in this office, and do hereby certify that the same is a correct transcript therefrom, and of the whole of said original law.

[L. S.] Given under my hand and seal of office, at the city of Albany, this twenty-second day of May, in the year one thousand eight hundred and seventy-one.

DIEDRICH WILLERS, JR.,
Deputy Secretary of State.

LAWS OF NEW YORK

CHAP. 650

AN ACT allowing the American Geographical Society of New York to take and hold a larger amount of real and personal property than under previous acts relating to that Society.

BECAME a law May 13, 1895, with the approval of the Governor.
Passed by a two-thirds vote.

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

SECTION 1. The American Geographical Society of New York may hereafter take and hold by gift, grant, purchase, devise or bequest, subject, except in the matter of income, to all provisions of law relative to devises and bequests by last will and testament,

real and personal property to the amount of one million dollars, and any income therefrom accruing, for the uses, purposes and objects of the said Society.

§ 2. This act shall take effect immediately.

STATE OF NEW YORK, }
Office of Secretary of State. } ss.:

I have compared the preceding with the original law on file in this office, and do hereby certify that the same is a correct transcript therefrom and of the whole of said original law.

JOHN PALMER,
Secretary of State.

BY-LAWS
OF THE
AMERICAN GEOGRAPHICAL SOCIETY

AS AMENDED NOVEMBER 21, 1911

THE following By-Laws are hereby established as the rules and ordinances of the American Geographical Society, and all other By-Laws, Rules and Regulations heretofore made are hereby repealed.

CHAPTER I

MEMBERSHIP

1. The Society shall consist of Fellows and of Honorary and Corresponding Members.

2. Honorary Members shall be chosen on account of their distinction in the science of geography, or of statistics, and not more than three of them shall be elected in any one year.

3. Corresponding Members shall be chosen from those who communicate valuable information to the Society and who have promoted the knowledge of geography, or of statistics.

4. Fellows, Honorary Members and Corresponding Members shall be elected by the Society as follows: All nominations of candidates shall be made in writing at a meeting of the Council by a member thereof. The names of persons thus nominated, if approved by the Council, shall be recommended to the Society for election at its next stated meeting.

5. The name of any Fellow or Member of the Society may be dropped from the rolls by vote of the Council, without reference to the Society.

CHAPTER II

INITIATION FEE AND ANNUAL DUES

1. Each Fellow of the Society shall, immediately on election, pay an initiation fee of ten dollars, which shall be considered to include his annual dues for the current year.

2. The annual dues of each Fellow thereafter shall be ten dollars, payable in advance on the 1st of January.

3. Any Fellow of the Society, not in arrears, may commute for life all dues, by the payment at one time of one hundred dollars.

4. The name of any Fellow of the Society who has neglected for two successive years to pay the annual dues, or who at any time refuses to pay them, may, by the Council, be dropped from the list.

5. The fiscal year of the Society shall be the calendar year commencing January 1, and ending December 31.

6. Honorary and Corresponding Members shall be exempt from payment of initiation fee and annual dues.

CHAPTER III

OFFICERS

1. The officers of the Society shall be a president, three vice-presidents, a foreign corresponding secretary, a domestic corresponding secretary, a recording secretary, a treasurer and fifteen councillors; and these together shall form the Council of the Society.

2. All the officers above-named shall be elected by the Society at its annual meeting.

3. No one shall be voted for, for any office, unless he has been nominated by the Council, or unless his nomination, made in writing by at least nine Fellows of the Society, has been conspicuously posted in the office of the Society for ten days prior to the date of the Annual Election.

4. The president and treasurer shall each be elected for one year and until their successors have been elected; and at each annual meeting there shall be elected one vice-president, one secretary, and five members of the Council, each for the term of three years and until their successors have been elected.

5. All officers to be elected may be voted for on one ballot.

6. There may also be an Honorary President who shall be appointed by the Council in recognition of distinguished and valuable services to the Society, and shall hold office during the pleasure of the Council. He shall be invited to attend all meetings of the Society, the Council and all Committees thereof, for the purposes of consultation and advice. He shall not be required to perform any duties.

7. Any Fellow of the Society, who has been such for twenty days and who is not in arrears for dues, shall be entitled to vote at the annual election.

CHAPTER IV

ANNUAL MEETING

1. The annual meeting of the Society shall be held on the second Monday in January, or on any other day which may be designated by the Council for the purpose.
2. At the annual meeting the Council shall present a report of the proceedings of the Society during the past year, and the treasurer shall present his annual report.

CHAPTER V

MONTHLY AND SPECIAL MEETINGS

1. The Society, unless it is at any time specially ordered otherwise by the Council, shall hold a stated meeting for the transaction of business on the second Monday of each month except July, August, September and October.
2. The president, or, in his absence or incapacity, one of the vice-presidents, may, and upon the written request of the Council or of twenty-five members of the Society shall, call a special meeting of the Society by giving three days' notice thereof in two daily newspapers published in the city of New York.

CHAPTER VI

ORDER OF BUSINESS

1. At stated meetings of the Society the order of proceedings shall be:

Reading of the minutes.

Reports and communications from officers of the Society.

Communications from the Council.

Reports from committees.

Election of members.

Miscellaneous business.

Papers and Addresses.

2. All propositions presented to the Society at any meeting, for action, shall be in writing. A proposition thus presented, when seconded, shall be deemed to be in possession of the Society and open for discussion, but may be withdrawn by the mover at any time before amendment or decision.

3. No member shall speak more than five minutes, nor more than once, upon the same question, until all other members present have

had an opportunity to be heard, nor more than twice on any question, unless leave is specially granted by the Society.

CHAPTER VII

QUORUM

1. At meetings of the Society nine members present shall constitute a quorum.

CHAPTER VIII

COMMITTEES

1. Each committee authorized by the Society shall consist of three members, who shall, unless otherwise ordered, be appointed by the chairman.

CHAPTER IX

PRESIDING OFFICER

1. At all meetings of the Society, on the arrival of the appointed hour and the presence of a quorum, the president, or, in his absence, one of the vice-presidents, or, in the absence of all of these officers, a Fellow of the Society shall take the chair and call the meeting to order.

2. The chairman shall have only a casting vote. He shall preserve order and decide all questions of order, subject to an appeal to the Society. At every annual meeting, before the opening of the polls, he shall appoint two tellers of the election. In case of a contest, he may declare the election postponed to the next meeting, in order that a corrected poll list may be prepared by the secretary and verified by the Council; but only one such postponement shall be made.

CHAPTER X

SECRETARIES

1. It shall be the duty of the Foreign Corresponding Secretary to conduct the correspondence of the Society with individuals and associate bodies in foreign countries.

2. It shall be the duty of the Domestic Corresponding Secretary to conduct the correspondence of the Society with individuals and associate bodies in the United States.

3. In case of vacancy in the office of either of the corresponding secretaries, or in the absence or disability of either of these

officers, the duties of either may be performed by the other secretary, or by the librarian.

4. The secretaries shall keep in books at the rooms of the Society copies of all letters written by them, and shall file at the said rooms all letters received by them on behalf of the Society.

5. At each stated meeting of the Council they shall respectively report their correspondence, and read the same or such parts thereof as may be required.

6. The Council may designate a particular officer, or appoint a committee, to prepare a letter or conduct a correspondence on any special subject.

7. It shall be the duty of the Recording Secretary to give due notice of all meetings of the Society and to attend the same. He shall keep adequate minutes of the proceedings of the Society. He shall give immediate notice to officers and committees of all votes, orders, resolves, and proceedings affecting them or pertaining to their respective duties. He shall at each annual election hand to the tellers a list of the members of the Society entitled to vote. He shall have charge of the seal of the Society and of the charter, by-laws, records and general archives, except so far as they may be placed by the Council in charge of others. He shall sign and affix the seal of the Society to all diplomas, deeds or other documents authorized by the Society or Council.

8. All documents in charge of the secretaries shall be kept at the rooms of the Society, unless otherwise specially ordered by the Council.

CHAPTER XI

TREASURER

1. The Treasurer shall have charge of all deeds, contracts, bonds, certificates, securities and muniments of title belonging to the Society. He shall collect all dues to the Society and keep the funds safely deposited in some incorporated bank or trust company approved by the Council.

2. Funds so deposited may be drawn out only by check of the Treasurer, countersigned by the Chairman of the Council, or by such other officers as may be designated by the Council and authorized to sign checks in case of the absence or incapacity of the Treasurer or the Chairman or both.

3. The Treasurer shall, prior to the annual meeting of the Society, prepare and submit to the Council for audit a detailed ac-

count of his receipts and disbursements during the past year, which account, duly audited and approved, he shall present to the Society at the annual meeting.

CHAPTER XII

COUNCIL

1. The Council shall have the management and control of the affairs, property, library, and funds of the Society, and shall transact all such business of the Society as is not required to be transacted by the Society at a stated meeting. It shall designate a bank or trust company in the city of New York in which the funds shall be deposited by the treasurer. It shall have charge of and edit all the publications of the Society.

2. It may adopt rules for its own government, not inconsistent with the charter and by-laws of the Society; and appoint such standing and special committees as it may deem proper, and define their duties. It shall appoint the librarians, clerks and other servants of the Society, and fix the powers, duties, privileges and compensation of each. But no appointment shall be made which shall not be revokable at the pleasure of the Council.

3. It shall have power to fill for the unexpired term any vacancy that may occur in its own body or in any of the offices of the Society, and it may declare a vacancy to exist in any office whenever the incumbent thereof is, by reason of absence or otherwise, incapable of performing its duties. It shall have power to declare vacant the seat of any member of its own body (except the president and vice-presidents) who shall have been absent from its meetings for three successive months. It shall have power to elect for life an Honorary President of the Society in accordance with the provisions of Chapter III, Section 6 of these By-Laws.

4. The Council may for good cause remit the annual dues of any Fellow of the Society.

5. No member of the Council shall, directly or indirectly, receive any salary or pecuniary compensation for his services to the Society.

CHAPTER XIII

ALTERATION OF BY-LAWS

No alteration in these by-laws shall be made, unless proposed in writing at a stated meeting of the Society and referred to the Council for consideration, and approved by the Council and adopted by the Society at a subsequent meeting.

BULLETIN
OF THE
AMERICAN GEOGRAPHICAL SOCIETY

Vol. XLIII

1911

No. 1

POTOSÍ

BY

PROF. HIRAM BINGHAM
Yale University

In November and December, 1908, I was engaged in following on mule-back that part of the old Spanish trade route from Lima to Buenos Aires which lies in Southern Bolivia. The chief objective point of all traders in colonial days was Potosí, which was, for over a century, the largest city in the Western Hemisphere. With the comparative exhaustion of its silver mines, decay set in and it became little more than a memory until the increasing demand for tin caused a renewal of local activity.

I had long had a desire to see this spot towards which the covetous eyes of the world were turned for so many years. And I had not been here many hours before I realized that it was still a most fascinating place, with an atmosphere of departed greatness quite unique in America. By the time I had been in Potosí a week I was ready to agree with those who call it the most interesting city in South America.

The prestige of its untold wealth, the evidence on every side of former Spanish magnificence, the picturesquely clad Indians and the troops of graceful, inquisitive llamas in the streets, could not help but arouse both curiosity and interest.

My first duty was to call on the Prefect, who had been expecting our arrival and was most kind during our entire stay. A Bolivian Prefect has almost unlimited power in his Department and is directly responsible to the President. His orders are carried out by the Sub-

Prefect, who is also Chief of Police and has a small body of soldiers under his immediate control.

We found the Government House, or *Prefectura*, to be a fine old building dating back to colonial days. Probably the most interesting person that has ever occupied it was Gen. William Miller, that picturesque British veteran who fought valiantly through all the Peruvian wars of independence, receiving so many wounds that he was said to have been "honeycombed with bullets." At the end of the wars he was appointed Prefect of Potosí and it was during his incumbency that the great Liberator Simon Bolivar made his visit. There is a vivid description of it in Miller's "Memoirs." When Bolivar arrived in sight of the far-famed mountain, the flags of Peru, Buenos Aires, Chile and Colombia were unfurled on its summit. As he entered the town, twenty-one petards were exploded on the peak, an aerial salute "that had a very singular and imposing effect." "Upon alighting at the Government-house, under a grand triumphal arch, decorated with flags, the reception of his Excellency was according to the Hispanic-American taste. Two children, dressed as angels, were let down from the arch as he approached, and each pronounced a short oration! Upon entering the grand saloon, six handsome women, representing the fair sex of Potosí, hailed the arrival of his Excellency, crowned him with a wreath of laurel, and strewed flowers, which had been brought from a great distance for the occasion." This was followed by seven weeks of bull fights, dinners, balls, fireworks, illuminations and other signs of public rejoicing, which would seem to have surfeited even a person so fond of pomp and adulation as the great Liberator.

Opposite the Government House, on the east side of the main plaza, is a curious many-arched rococo wall which encloses a new and smaller plaza, the work of an ambitious Prefect. The tall column surmounted by a statue that stands as its only ornament, once stood in the center of the larger square, but was moved to its new position by the Prefect who decided his work would be incomplete unless properly graced by a monument!

On a corner of the new plaza is Potosí's only book shop. Judging by the stock in trade, the principal customers are school children and lawyers. Trade was dull when we were there, although considerable interest was shown in those departments of the store where toys and picture post cards were on sale.

Nearby is the "University," where inferior secondary instruction is given to poor little boys, who sit on damp adobe seats in badly lighted, foul-smelling rooms. It was once a convent, but the church

connected with it has long since been transformed into a theatre. The only attractive thing about the "University" is the charming old convent garden, where a few rare flowers still try to bloom.

Opposite the "University" is the club. Here there are billiard tables (it is really remarkable how many billiard tables one finds scattered all over South America, even in the most inaccessible places) and a bar. The custom of serving a felt mat with each drink is resorted to, and when a member chooses to stand treat, he goes about and gathers up all the mats in sight and pays for them with his own money, or some that he has recently won. The bar was well



FIG. 1.—The Slopes of the Cerro, Potosí in the distance.

patronized. And no one is to blame but the climate, which is the worst in South America.

Although Potosí is in the tropics, the highest recorded temperature here in the shade on the hottest day ever known, was 59° F. The city is nearly 13,500 feet above the sea, almost as high as Pike's Peak. Every afternoon cold winds sweep down through the streets, striking a chill into one's very marrow. A temperature of 22° F. is not unknown, yet none of the houses have stoves or any appliances (except soup) for warming their shivering inhabitants. As the prevailing temperature indoors is below 50° F., nearly every one wears coats and hats in the house as well as outdoors, or even more so, for a brisk walk of a block or two at this altitude makes one quite warm, and in the middle of the day the sun is hot.

Wherever we wandered in this fascinating city, our eyes con-

tinually turned southward to the Cerro, the beautifully colored cone that raises itself 1,500 feet above the city. It is impossible to describe adequately the superb variety of its tints and the wonderful way in which they change as the sun sinks behind the western Andes. I hope that some day a great painter will come here and put on canvas the marvelous hues of this world-renowned hill. Pink, purple, lavender, brown, gray and yellow streaks make it look as though the gods, having finished painting the universe, had used this as a dumping ground for their surplus pigments. In reality, the hand of man has had much to do with its present variegated



FIG. 2—View from the Prefect's window in Potosí showing both the old and the new Plaza, the Cathedral and the theatre.

aspect, for he has been busily engaged during the past 300 years in turning the hill inside out. Much of the most beautifully colored material has been painfully brought out from the very heart of the hill through long tunnels, in man's effort to get at the silver and tin which lie within.

The discovery of silver at Potosí was made by a llama driver about the middle of the 16th century. It was soon found that the mountain was traversed by veins of extremely rich ore. After the gold of the Incas had been gathered up and disposed of, Potosí became the most important part of all the Spanish possessions in America. At the beginning of the 17th century, when New York and Boston were still undreamed of, Potosí was already a large and very wealthy city. It attracted the presence of hundreds of Spanish

adventurers, including many *grandees*. In short, it had taken on all the signs of luxury that are common to big mining camps. *Grandees* in sumptuous apparel rode gaily caparisoned horses up and down the stony streets, bowing graciously to charming ladies dressed in the most costly attire that easily gotten wealth could procure. On feast days, and particularly on national holidays like the King's birthday, elaborate and expensive entertainments were given.

If it were not for the wide expanse of ruins and the very large number of churches, it would be difficult to realize that this was ever the largest city in America. The routes which led to the Bolivian plateau became the greatest thoroughfares in America. Money flowed more freely than water. In fact, the Spaniards found considerable difficulty during the dry season in supplying the city with sufficient quantities of the latter commodity to use in washing the ore and in meeting the ordinary needs of a large population. Consequently, they went up into the hills above the city and built, at great expense, a score of dams to hold back the water that fell during the rainy season and preserve it for the dry.

Immediately following the Wars of Independence and the consequent opening of the country to foreign capital, a wild mining fever set in among London capitalists. Greedy and ignorant directors took advantage of the cupidity of the British public to enrich themselves, while incidentally working the mines of Potosí with disproportionately expensive establishments. So eager was the public to take stock in Potosí that shares which at the outset were quoted at 75 or 80, rose incredibly in the short space of six weeks. Some of them went up above 5,000. As was to be expected, this speculative fever was followed by a panic which ruined not only the stockholders but those unfortunates like Edmund Temple, who had gone to Potosí in the employ of one of the wildcat companies, and those South Americans that had honored their drafts on London. Then followed a long period of stagnation. But as railroads came nearer and cart roads began to multiply, transportation became cheaper and new enterprises sprang up.

Any one is at liberty to secure a license from the proper authorities to dig a mine in the side of the mountain, provided he does not interfere with the property of some one else. The records show that since the Cerro was first discovered over 5,000 licenses have been issued. It is easy to imagine what a vast underground labyrinth exists beneath those many-colored slopes. Most of the openings, however, have been closed by avalanches of refuse from excavations higher up the hill.

One day I was invited to visit several new mines that had recently been opened by a Chilean Company. In one, at an altitude of about 15,000 feet, I undertook to crawl into the depths for 500 yards in order to see a new vein of silver ore that had recently been encountered. The exertion of getting in and out again was terrific, yet the miners did not appear to feel it. They wear thick knitted hoods which save their heads from the bumps and shield them from falling rocks. Their knees are protected by strong leather caps. Their feet they bind in huge moccasins. Those that carry out the ore frequently wear leather aprons tied on their backs. The work-



FIG. 3.—The Market Place from the roof of the Mint.

men are a sordid, rough-looking lot, who earn, and deserve, very good wages. Some time ago, when tin was higher than it is now, a large number of new projects were begun and unheard-of prices were paid for labor. Now that the price of tin has fallen, it is extremely difficult to get the Indians to accept a lower scale of wages. Consequently, most of the new mines have had to be abandoned.

In the old days, the tin was discarded as the eager Spanish miners thought only of the silver. But now the richer veins of silver have become exhausted, and although some are being worked, most of the activity is confined to the tin ore. At the top of the cone there is an immense quantity of it, the only difficulty being to get it down to the smelters in the valley between the hill and the city.

In this ravine runs a small stream of water that comes from the

Spanish reservoirs. Attracted by its presence, most of the smelters have located themselves on one side or the other of the little gorge. There are innumerable small *ingenios* worked by the Indians in a very primitive fashion. Some of them are scarcely more than a family affair. Besides these there are twenty-eight large smelters, all of them devoted more to tin than to silver. Not one is owned by a Bolivian. A few belong to English capitalists, more to Chileans, and the largest of all to a Frenchman who has constructed an aerial railway to bring the ore from high up on the mountainside to his furnaces. The never-ending line of iron buckets adds a curiously modern note to the ruins over which they pass. Ore is also brought down in sacks on the backs of donkeys and llamas.

The workmen are mostly Quichuas. Some of them are evidently not city bred, for they dress with the same pigtails and small clothes that they wore when Spanish *conquistadores* forced them to take the precious metal out of the hill without any thought of reward other than the fact that they were likely to die sooner and reach heaven earlier than if they stayed quietly at home. The product of this smelter is shipped both as pure tin, in ingots, and also as highly concentrated and refined ore.

The most picturesque feature of the valley was a small chimney smoking lustily away all by itself, high up on the opposite hillside, like a young volcano with a smokestack. In order to get a good draft for the blast furnaces, the smoke is conducted across the stream on a stone viaduct, enters the hill by a tunnel and ascends a vertical shaft for 150 feet to the chimney, which then carries it 30 feet further up into the air. The tunnel does just as good work in the way of producing a draft as though it were a modern brick chimney 200 feet high, but the effect is uncanny, to say the least.

We found among the boarders at the Hotel Colon a group of young Peruvian and Chilean mining engineers, who were very congenial. They made the best of their voluntary exile, and although none of them enjoyed the fearful climatic conditions, they managed to make their surroundings quite tolerable with hard work, cheerful conversation, birthday dinners, and social calls.

The courtyard of the hotel was a good example of the prevailing mixture of old and new. The roof was covered with beautiful large red tiles, whose weight had crushed down the rafters in places so as to produce a wavy effect. Meanwhile, the shaky balcony that ran around the court connecting the rooms on the second floor was sheltered from the rain by strips of corrugated iron! The stone-paved patio was marred by a vile wainscoting painted in imitation of

cheap oil cloth. In one corner stood a little old-fashioned stove, where *arrieros*, who have to make an early start, cook their tea without disturbing the hotel servants. An archway, running under the best bedrooms of the second floor, led out to the street. Another archway led in to the filth of the backyard, where, amid indescribable scenes and smells, six-course dinners were prepared for our consumption. It was a miracle that we did not get every disease in the calendar.

Opposite the hotel was a fine old building, with a wonderfully carved stone gateway and attractive iron balconies jutting out with



FIG. 4.—Potosí Tin in Ingots.

stone supports from each second-story window. It is now the residence and warehouse of one of the largest importers in Bolivia. Once it was the abode of a Spanish marquis. The exquisitely finished exterior bears witness to the good taste of its builder and the riches and extravagance that once ran riot here.

So also do the beautiful stone towers, all that are left standing of the Jesuit church. The church itself has disappeared, but the solidly constructed, exquisitely carved towers remain as silent witnesses to the power of that Christian Order that did most to advance the cause of civilization in South America.

Unquestionably the most picturesque part of Potosí is the marketplace and the streets in its immediate vicinity. Hither come the miners and their families to spend their hard-earned wages. Here can be purchased all the native articles of luxury: coca, *chupe*,

frozen potatoes, parched corn and *chicha* (native hard cider, made from anything that happens to be handy).

The streets are lined with small merchants who stack their wares on the sidewalk against the walls of the buildings. There are no carriages and few horseback riders, so that one does not mind being crowded off the sidewalks by the picturesque booths of the Quichua vendors.

In the streets flocks of llamas driven by gaily dressed Indians add a rare flavor not easily forgotten. The llamas move noiselessly, only making little grunts of private conversation among themselves, quite haughty yet so timid withal, they are easily guided in droves of fifty by a couple of diminutive Indians.

To see these ridiculous animals stalking slowly along, looking inquisitively at every one, continually reminded me of Oliver Herford's verses about J. W. Beane in Boston who

" Looked about him with that air
Of supercilious despair,
That very stuck-up people wear
At some society affair
When no one in their set is there."

In the immediate vicinity of the market-place every available inch on each side of the street is used by the small tradesmen. They are allowed to erect canopies to protect their goods from the sun and rain and the general effect is not unlike an Oriental street. On one corner are piled bolts of foreign cloth, their owners squatting on the sidewalk in front. On another corner, leaning against the white-washed walls of a building, is a native drug store. The different herbs and medicines exposed for sale in the little cloth bags are cleverly stacked up so as to show their contents without allowing the medicines to mix. The most conspicuous article offered for sale is coca, which is more to the Quichua than tobacco is to the rest of mankind.

The market-place itself is roughly paved with irregular stone blocks and is surrounded by arcades where are the more perishable European goods. The vendors of Indian merchandise squat on the stones wherever they can find a place and spread out before them their wares, whether they consist of eggs or pottery, potatoes or sandals. It is the custom to arrange the corn and potatoes in little piles, each pile being worth a *real*, about four cents in our money, the standard of value in the market-place. Under umbrella-like sheiters are gathered the purveyors of food and drink, their steaming cauldrons of *chupe* surrounded by squatting Quichuas, who can thus get warmed and fed at the same time.

The Quichua garments are of every possible hue, although red predominates. The women dress in innumerable petticoats of variegated materials and wear warm, gaily colored shawls, brought together over the shoulders and secured with two large pins, occasionally of handsome workmanship, but more often in the shape of spoons. Generally, they are content with uninteresting felt hats, but now and then one will have a specimen of a different design, the principal material of which is black velveteen, ornamented with red worsted and colored beads. On their feet the women usually wear the simplest kind of rawhide sandals, although, when they can afford



FIG. 5—Just outside of Potosí.

it, they affect an extraordinary footgear, an arched sandal with a French heel an inch and a half high, and shod with a leather device resembling a horseshoe.

Near the market-place is an interesting old church, its twin towers still in good repair. Services are rarely held here, and it was with some difficulty that we succeeded in finding the sexton, who finally brought a large key and allowed us to see the historical pictures that hang on the walls of two of the chapels. They are of considerable interest and appeared to date from the 16th century. We commented on the fact that a large painting had recently been removed and were regaled with a story of how a foreign millionaire had bribed some prelate or other to sell him the treasured relic!

In the 18th century Potosí boasted of sixty churches, but of these

considerably more than half are now in ruins. The abandoned portion of the city lies principally to the east and south. A few strongly built churches or church towers are still standing amid the remains of buildings that have tumbled down in heaps. Several of the old convents and monasteries, however, are still in a flourishing condition. To us the chief interest consisted of their collections of paintings and their beautiful flowers. Nothing was more refreshing in this mountainous desert than to walk in these sweet smelling gardens.

The principal object of interest in the city, however, is the Casa Nacional de Moneda, the great mint, which was begun in colonial days to receive the plunder that the Spaniards took out of the hill



FIG. 6—Llamas in the streets of Potosí.

by means of the forced labor of their Indian slaves. It extends over two city blocks, and is really a collection of buildings covered by a massive roof and surrounded by a high wall with only one entrance. The front is striking. At regular intervals along the roof are little stone ornaments like funeral urns. The few windows are carefully guarded with iron bars. On either side of the elaborately decorated façade of the two-storied portal are wooden balconies, over which projects the heavily timbered roof covered with large red tiles.

As one enters the great building from the street and passes between massive doors into a large courtyard, the first thing that attracts one's attention is an enormous face, four feet in diameter, which looks down at the intruder from over the archway that leads

to a second courtyard. The gigantic face has a malicious grin, yet bears a distinct resemblance to Bacchus. Who put it here and what it signifies, does not seem to be known. Suffice it to say that many of the Quichuas before starting on a journey, come to this courtyard and make obeisance to the face, throwing down in front of it a quid of coca leaves just as they used to do to the rising sun in the time of the Incas.

The courtyard is surrounded by an arcade with heavy arches, over which runs the carved wooden balustrade of the second story balcony. In the second patio, which is also paved with cut stones, a tiny narrow-gauge railway is used to carry silver ingots from the treasure room to the stamping machines. In one of the buildings is a physics laboratory. In another a little gymnasium. In still a third, a collection of minerals. All of which are evidences that here are the beginnings of a school of mines that is being developed under the able direction of an intelligent young Bolivian engineer who received his training at Notre Dame University in the United States. In another old building are still standing the great wooden machines that were formerly used in the process of hammering out the silver. In a large room on the second floor of still another are kept the vellum-bound records of the mint and all the dies which have been used for the past 200 years. According to the records, the silver taken from here in the colonial days amounted to about two billion ounces. Most of the stamping was done by hand. The Bolivian Government has cleared out two or three of the structures and installed modern machinery, imported from the United States.

One of the most remarkable features of the mint is the size and condition of the huge timbers that support the roof. They are as sound to-day as they were 200 years ago, when, with infinite labor, they were brought across the mountains from the distant forests of the Chaco.

The roof is surmounted by a number of small sentry boxes, which are connected by little paths and stairways that lead to all parts of the structure. In the old days, it was necessary not only to protect the "Money-house" against possible attacks from without, but to make sure that the Indians, who were assigned to work in the mint, did not escape from the attics where they slept at night.

I crawled through several of these attics where not even an underfed Quichua could stand upright. The roof was scarcely four feet above the floor. In the corners were rude fireplaces where they may have cooked their *chupe*, with dried llama dung as their only fuel. The rooms were dark, even in midday. The tiny peek-holes

that served as windows admitted scarcely any light. Altogether it was as wretched a dormitory as could possibly be imagined.

The view from the roof was very extensive. The romantic cone of the mountain-of-silver rises to the south beyond the graceful towers of the cathedral. East of it are the hills where the Spaniards built their famous reservoirs. Further east are higher hills which have been the scene of several bloody encounters in the unprofitable civil wars that have devastated Bolivia. Here on the battlefield of Kari Kari, several hundred unfortunate Indians, fighting for revolutionary leaders with whose selfish aims they had little sympathy, fell victims to the unfortunate habit of appealing to arms instead of ballots. North of us, in the foreground, is the picturesque market-place, while northwest, in the distance, the old trade route to Lima winds away through the barren hills. To the west the far extending vista discloses a wilderness of variegated hills and mountain ranges. While all around the quaint old arched roofs, rolling like giant swells of the Pacific, are surrounded by the narrow streets, the red tiled houses and the ruinous towers of this ancient and fascinating city.

GEOGRAPHIC INFLUENCES IN AMERICAN SLAVERY

BY

F. V. EMERSON
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"American History is largely the record of the adjustment of a migrating people to their environment."* The colonists came mostly from North Europe bringing with them a well-developed civilization into a virgin country of varied topography and resources and a climate ranging from sub-tropical to cold temperate. Their institutions, customs, laws, habits, in short, their civilization adapted themselves to their new environment. The earlier colonists were largely British and their common inheritance gave a unity to their civilization as it developed in different geographic environments. Had North America, north of the Ohio, been settled from North Europe, and the South been occupied by immigrants from Southern Europe, it is safe to say that both from differences in racial inheri-

* Ulrich B. Phillips: "A History of Transportation in the Eastern Cotton Belt," New York, 1908, p. 1.

tances and from different geographic environments, two very different civilizations would have sprung up in the United States.

Slavery was one of the institutions having an early beginning in the colonies and an existence prolonged to recent times. It was primarily economic in its development, or in other words, the institution thrived and developed in the areas where it paid the best. Its spread was conditioned largely by the geographic factors of soils, topography and climate. Other factors existed of course, some easily recognized and others difficult of analysis. Religious beliefs,

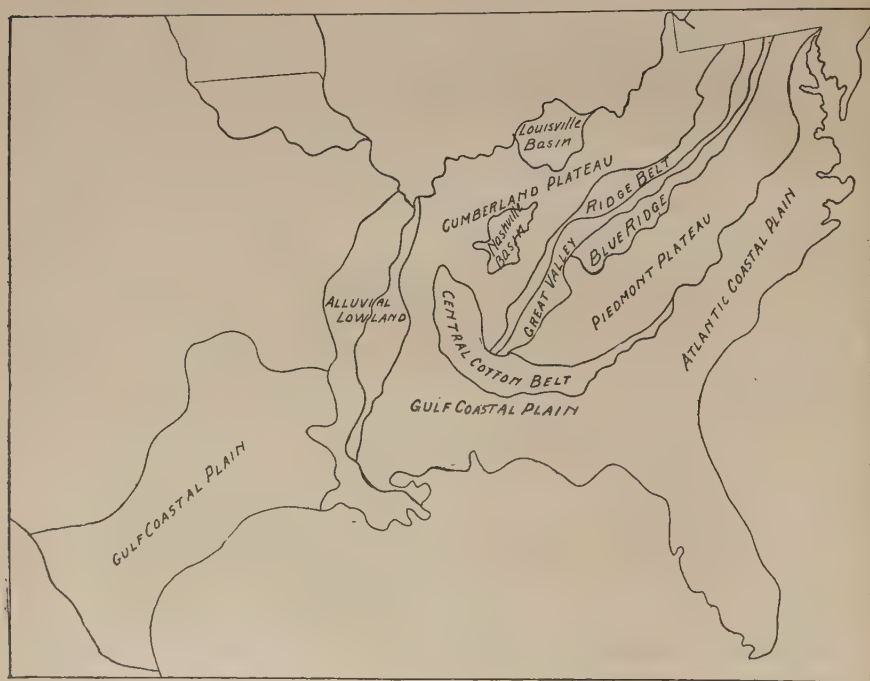


FIG. I.

the systems of land tenures, customs, prejudices and many other factors influenced the spread of slavery. But the notable extension of the institution was in areas whose geographic conditions favored the growth of crops to which slavery could be well adapted.

The purpose of this paper is to trace from the geographic standpoint the development and extension of slavery. The paper will necessarily include a discussion of the factors of the institution, a general survey of the South where the institution became characteristic, and a consideration of those areas in the South in which

slavery expanded and reached its most notable development. The discussion is more definite after 1790 because then the census returns became available; it is more complete from 1810 to 1860 because slavery had its greatest expansion and development in those decades.

Slavery arose in the colonies from an economic need. Land was cheap and plentiful, the ordinary necessities of life were easily obtained, but labor was scarce.* Wages were high, land was cheap or practically free, and there was a constant inclination on the part of the wage earner to take up new land, become a freeholder and own his own home. A few cleared acres would support his family and his cabin was easily erected.

Thus there arose a demand in all the colonies for enforced labor, but this demand was especially insistent in South Carolina and

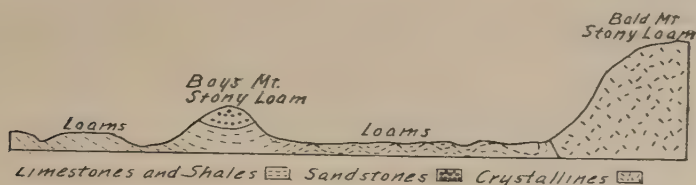


FIG. 2.

Section near Greenville, Tenn., in the Eastern part of the Ridge Belt. Bald, Mt., is a part of the Blue Ridge System. (From the Greenville Folio, U. S. G. S., and the U. S. Soil Survey of the Greenville Area.)

Georgia where the white laborer could not without danger endure the hard labor in the low malarial coast region which was, in colonial times, the principal area of population. The old law of war that made the captives slaves was early invoked in all the colonies with respect to the Indian and very early the system of white servitude was introduced from England. At best the Indian made a poor laborer. He was intractable and, if successfully retained as a slave, he did not long survive hard labor. The indentured white laborer served but a limited time and then became a freeman. In both of these servile types the owner's control was somewhat precarious.

Negro slavery was introduced largely as an experiment and its success even in the South was not assured for nearly fifty years† The negro slave proved far superior to the Indian or the indentured white. He was tractable, capable of hard work, hardy, and easily and cheaply maintained. He could endure heat and malarial con-

* U. B. Phillips: "The Economic Cost of Slave Holding," *Pol. Sci. Quar.*, Vol. 20, 1905.

† J. H. Bassett: "Slavery and Servitude in the Colony of North Carolina," *Johns Hopkins University Studies*, Vol. 4 1896.

ditions. On the other hand he has many inherent disadvantages. He was stupid and incapable of little but simple routine labor. Having learned the care of one crop, it was with difficulty that he could be taught the culture of another. His labor was more or less unwilling, and this, combined with his unintelligence, made necessary a close supervision of his work.* Slave labor must be organized and the slaves worked in gangs. It soon came about that the owner of a considerable number of slaves had an economic advantage over the owner of a small number; and out of this fact and the factor of cheap fertile lands, the plantation system developed.

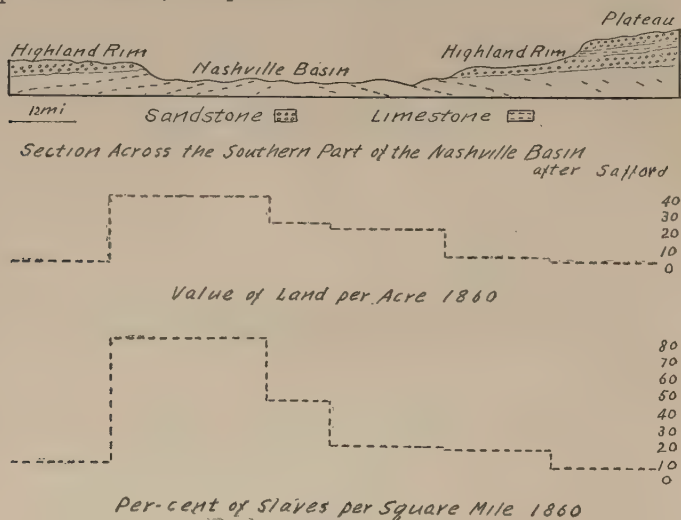


FIG. 3.

Profile, section and graphs of the southern part of the Nashville Basin.

The negro slave, then, was not available for all industries. He was never largely employed in anything but agriculture, and even in this he was restricted to certain crops. The ideal slave crop would have its cultivation extended well over the year, since slave labor was not versatile enough to be employed at different crops or to take up other work between crops. The cultivation must be simple and intensive enough so that the labor could be thoroughly supervised. If at any of its stages the women and children could be employed, that was a great advantage. Finally the output must be of considerable value since slave labor and the attendant poor methods of agriculture were, in the long run, expensive.

The principal crops fulfilling in various degrees these require-

* J. E. Cairnes: "The Slave Power," London, 1863.

ments were tobacco, indigo, rice, cotton and sugar. All of these staples require a fertile soil, abundant rainfall, and, except tobacco, a warm temperature. While tobacco could be raised in the North it never became a very large crop there. In the North the capitalist and *entrepreneur* turned toward commerce and manufactures, while in the South they found a promising field in agriculture. In the North the slave was largely a family servant instead of a field hand, and was unimportant in the life of the people. He had not the adaptability or intelligence to take a place in the varied industries of this region, and crops to which slave labor was adaptable were not profitable in the North. Consequently by the time of the revolution, slavery was nearly extinct both by custom and legislation in the states north of Maryland.

The institution then was economically excluded from the colonies north of Maryland. The ordinance of 1787 fixed the Ohio River as its northern boundary, west of the Alleghenies and east of the Mississippi, and the compromise of 1820 practically held it at the northern boundary of Missouri. South of these boundaries slavery could legally expand. In some places it became dominant, and elsewhere it was practically unknown. The factors of soil and climate which dominated the slave crops, and the factor of topography which markedly influenced the soil, and also in a greater degree the means and routes of transportation, all these factors likewise controlled the extension of slavery. The principal physiographic and climatic areas will first be briefly described, and the somewhat detailed descriptions of these various areas, together with the development of slavery therein, will follow the general description.

The principal physiographic provinces included in the slave states are the Coastal Plain, the Piedmont Plateau, the Blue Ridge, the Great Valley, the Ridge Belt, the Cumberland Plateau, and the Mississippi Alluvial Lowland. (Fig. 1.)

The Coastal Plain slopes gently from the Piedmont to the Atlantic and Gulf of Mexico. It is an upraised sea-bottom which continues beneath the Atlantic to the Continental Scarp. The sediments comprising the Coastal Plain are mostly unindurated and dip seaward at a low angle. Sand and clay are its principal constituents, although in places there is limestone. The inner margin of this division rises on the average from 100 to 200 feet above sea level. As one passes from the sea inland, the lower portion of the Coastal Plain is so level as to appear flat, but as the inner margin is reached there is considerable dissection and the surface is rolling and rough.

The entire shore of this division, especially in the north, has been

drowned with the result that the broad tidal estuaries reach well into the land and, in Virginia and Maryland, they often extend to the Piedmont. The rivers in the Coastal Plain have a low slope, are sluggish and often tidal. The larger streams are navigable well toward the Piedmont, a fact of no small importance in the development of this region. Along the shore from Virginia to Florida is a discontinuous line of off shore bars which are especially well developed off the North Carolina coast.

If the soils of the Coastal Plain were simply derived from the underlying rock, we would have a series of sub-parallel soil belts corresponding to the outcropping strata that compose the Coastal Plain. This holds true in some instances that will be mentioned later, but the greater part of this division is overlain by a veneer of sands

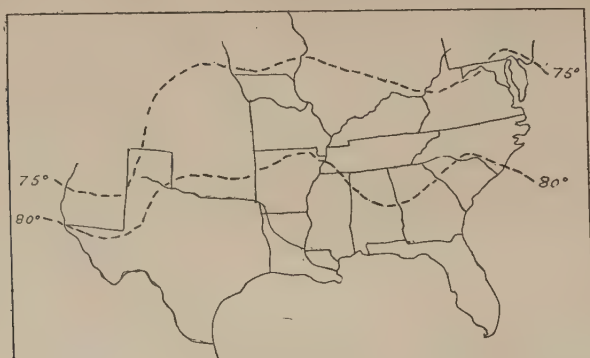


FIG. 4.

Average Temperatures for July.

and loams of the Lafayette and Columbia formations whose precise origin is as yet unsettled. While there are clays and silts found in these formations, they are predominantly composed of sands and sandy loams. The silt and clay areas are best developed in the Gulf Coastal Plain.* The characteristic soils of the Coastal Plain are therefore sandy.† Such a soil is warm and stimulating but easily exhausted. The sluggish rivers are commonly flanked by flood plains, which, when they can be drained, are very fertile.

The Piedmont Plateau forms the inner boundary of much of the Coastal Plain. In general the junction of these two divisions is marked by a low though somewhat persistent slope. The streams flowing over this junction commonly descend in falls or rapids, thus

* W J McGee: "The Lafayette Formation." 12th Annual Report of the U. S. Geol. Surv., 1890-91, Part I. McGee's paper is the most complete report of these formations yet published.

† "Soils of the United States." Bull. No. 55, U. S. Soil Survey, 1909.

giving the name "Fall Line" to this slope, a feature that has marked influence in transportation and the location of towns. Back of the Fall Line, the Piedmont slopes gently upward to the Blue Ridge.

In contrast with the Coastal Plain, the rocks of the Piedmont are largely crystalline and relatively hard. The surface is moderately dissected so that the term "rolling" is often applied. As the Blue Ridge is approached the dissection becomes greater and the country more mountainous.

The soils of the Piedmont are largely residual, being derived from the granites, schists, gneisses, slates, etc., which underlie the division. Such rocks in weathering yield sand and clay. Piedmont soils therefore contain a higher content of clay than do those of the Coastal Plain, and vary from heavy clays through loams to sandy-

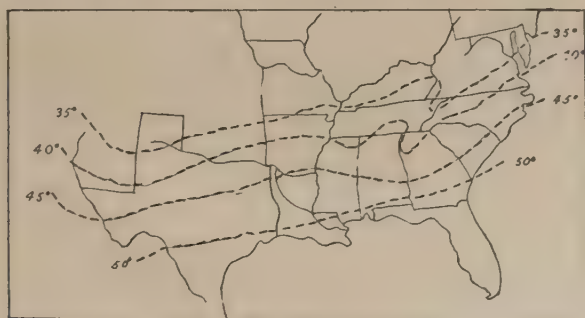


FIG. 5.

Average Temperatures for January.

loams. These soils are in general retentive of moisture, they contain considerable humus, and are far less easily exhausted than are those of the Coastal Plain.

The Blue Ridge, like the Piedmont Plateau, is a mass of crystalline rocks. It lies to the west and northwest of the Piedmont and has an altitude considerably above that of the latter. In horizontal outline it is club-shaped with the smaller end on the Potomac. (Fig. 1.) Near the Potomac the Blue Ridge has an altitude of 1000 feet and it rises to an average altitude of 3000 to 4000 feet in its southern portion. In the northern part there are frequent wind and water gaps that afford easy access from the Piedmont to the Great Valley. In the southern portion are several intermontane valleys encircled by high mountains, the largest of these being the Ashville Basin on the upper French Broad River.

The soils of the Blue Ridge are derived from the same kinds of rocks as are most of the Piedmont. However, the thorough drain-

age consequent upon the steep slopes leaves much of the region with thin soils. In the intermontane valleys a deep fertile soil has often accumulated. The elevation of the Blue Ridge gives it a somewhat more severe climate than that of the Piedmont or the Coastal Plain in the same latitude.

The Great Valley and Ridge Belt extend from New York to Alabama. Here the rock is sedimentary and is folded. The harder strata, mostly sandstone and siliceous limestone, are left projecting as ridges, while the softer limestones and shales are etched by erosion into valleys, (Fig. 2.). The Great Valley is a long structural valley forming the eastern boundary of the Ridge Belt. The Shenandoah River flows along the Great Valley in Virginia and the Tennessee River, in Kentucky and Tennessee. West and north of this division

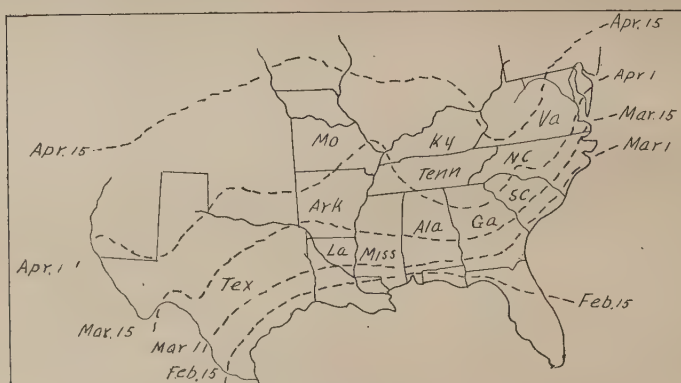


FIG. 6.

Average Dates of last Frosts in Spring.

is the Ridge Belt. Long, narrow ridges, broken by wind gaps and water gaps, alternate with narrow valleys. The soils of the ridges, both from the composition of their rocks and from their steep slopes, are naturally unfertile. The valley soils, derived largely from limestones and shales, are generally fertile. (Fig. 2.) The Great Valley with its long reaches of level floor and fertile soils, is an important agricultural province.

The folded rocks of the Ridge Belt grade into the approximately horizontal rocks of the Cumberland Plateau, from which it is usually separated by a prominent escarpment. The Cumberland Plateau slopes gently north-westward and westward, and merges into the Ohio Basin. The western part of the Plateau is overlain by carboniferous limestone which affords fairly fertile soils. The central and eastern Plateau is overlain by sandstone and underlain

by limestone. The sandstone covers much of the Plateau, except in some of the deeper valleys which have been eroded to the limestone and along a low anticline that extends from Ohio into Tennessee. In places along this anticline the overlying sandstone has been eroded leaving the Louisville Basin in Kentucky and the Nashville Basin in Tennessee floored by limestone. There are few better examples than these showing the influence of the underlying rock upon the soils, and, in turn, the influences of these various soils upon the inhabitants. Without the Basins the soil is sandy and rather sterile; in the Basins the prevailing limestone soils are very fertile. The graph in Figure 3 brings out these contrasts in soil values.

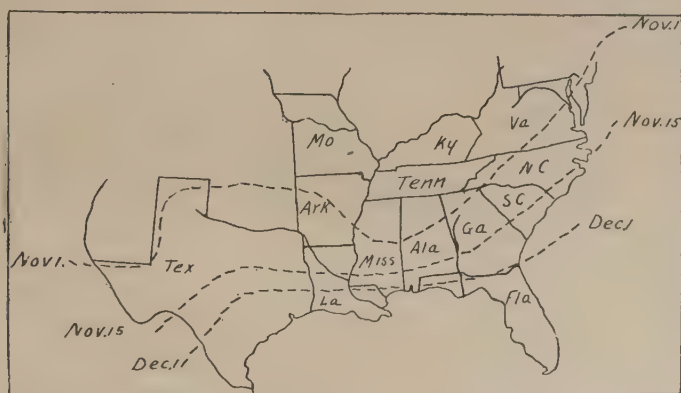


FIG. 7.

Average dates of first frosts in Autumn.

Such then were the various physiographic divisions in which slavery was allowed to develop. Various minor divisions and details have been left to be considered later in connection with their appropriate areas.

A geographic factor even more vital than physiography and soils is climate. A given type of fertile soil, alluvium for example, is widely distributed, but the crops obtained therefrom are closely conditioned by temperature and rainfall. The climate of the South, with the possible exception of Florida, is essentially continental. It is characterized by sudden variations and the contrasts between winter and summer are considerable, such contrasts becoming more marked in the northern and western portions.

So far as the temperatures are concerned, the climate of the South is mild and even warm. The summers are hot and the winters are moderate. (Figs. 4 and 5.) The higher elevations of the Blue

Ridge and Cumberland Plateau somewhat depress the isotherms, but most of this section has a moderate or low relief.

However, the crop possibilities are sharply conditioned by spring and autumn frosts. The growing season of most crops is included between the latest frosts in spring and the earliest in autumn. This is especially true of the principal slave crops, tobacco, rice, sugar and cotton. Figs. 6 and 7 show a rough division of the South into two frost provinces. Virginia, North Carolina, Tennessee and Kentucky have a growing and harvesting season of about seven months, while the rest of the South has a considerably longer season. The rainfall of the South is in general ample for all crops and is well dis-

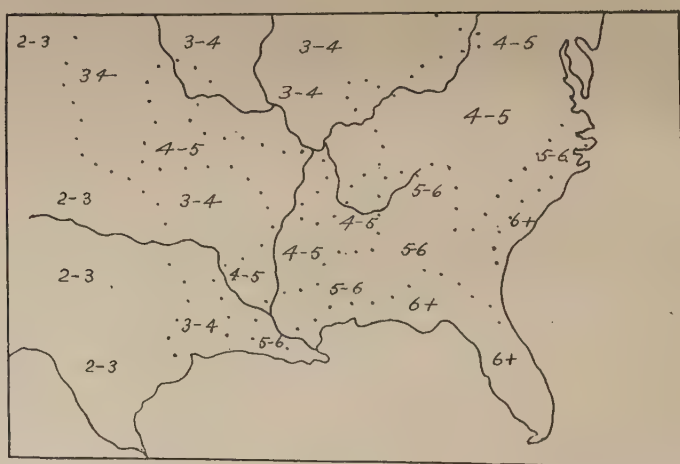


FIG. 8.

Average Rainfall for July (in inches).

tributed during the crop growing seasons. (Figs. 8 and 9). Most of the South has a mean annual rainfall of from 40 to 60 inches with a minimum in the autumn. Southern Louisiana, Mississippi and Alabama have a high annual rainfall and also a high autumnal rainfall.

Like colonization by the whites, the institution of slavery first began at the coast region, that is to say, at the eastern margin of the Coastal Plain. Its earliest development was in eastern Virginia, South Carolina and Georgia, since these regions were easily accessible and near the slave marts of the West Indies.* North Carolina was settled later in large part by migrations from the adjacent col-

* W. E. B. DuBois: "Suppression of the Slave Trade," *Harvard Historical Studies*, 1904.

onies.* This deferred settlement of North Carolina was mainly a response to the character of the coast, which is largely fronted by long off shore bars, the inlets through which were shallow and shifting, while the smooth coast offers no good harbors except in the southern part of the state at Wilmington. (Fig. 10.)

It was on this eastern seaboard that the two main slave regions which persisted to the end of the slave period were initiated. We have noted that the slave crops determined the expansion of slavery. These crops have rather sharp climatic limits, the principal conditioning factor of which is frost although the other climatic factors are not unimportant. Tobacco was the principal slave crop in that

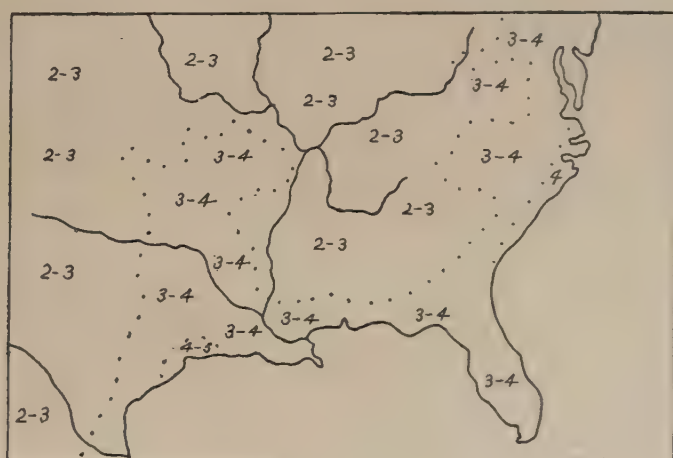


FIG. 9.

Average Rainfall for October (in inches).

part of the South which had a mild climate and short growing season, while rice, cotton and sugar require a longer growing season and a hotter temperature. Virginia, much of North Carolina, Kentucky and much of Tennessee became and continued a tobacco growing region with cereals and live stock as subsidiary products. The rest of the South was ultimately given over for the most part to cotton, rice, and sugar. The *ante bellum* terms "Tobacco South" and "Cotton South" have therefore a geographic significance. They denote the two main areas into which slavery expanded and in which, largely for geographic reasons, the institution acquired conditions somewhat characteristic. The geographic expansion of slavery.

* Bassett, *op. cit.*

therefore, will be discussed mainly with reference to these two crop districts, although, of course, they were not closely delimited from each other.

The tobacco plant is a flowering annual which will grow under a somewhat wide range of climatic conditions. It is a native of the tropics but it can be grown in a temperate climate. The ordinary varieties thrive best in a warm, fairly moist climate and on a fertile, loamy soil. More than most others, the crop quickly impoverishes a soil. In colonial times, at least, tobacco was not grown for export north of Maryland.

The culture of tobacco is necessarily intensive and demands careful attention at each stage. At least seven different operations are demanded during the growing and harvesting season. The seed bed is carefully prepared and the plants are set. The crop must be ridden of worms and pests. Superfluous "suckers" must be pulled off and the plants "topped" or cut back. Finally comes the picking, curing and packing. Meanwhile the soil must be cultivated and the weeds kept down.*

In its growing stage much of the culture is simple and does not demand hard work. While the stronger slaves were hoeing and cultivating, the women and children could pick the worms from the plant.† Tobacco was therefore especially suited to slave labor.

The culture of tobacco began, of course on the Coastal Plain in Maryland and Virginia where the fresh soils generally yielded good crops. During colonial times there was usually a brisk European demand and the home government's policy favored tobacco culture.‡ Slavery was therefore profitable and yielded quick returns on the investment. Both by the crop demands and by the continuous planting of tobacco without crop rotation, the sandy soils of this region were quickly impoverished. Land was so cheap and abundant that it was cheaper to take up and clear new land than to improve the old. Tobacco culture, therefore, together with its accompanying system of slave labor, moved westward leaving sand wastes in place of the fertile soil that had been deprived of its humus.

By 1790 slavery was well established on the Piedmont but still there was a dense slave population on the Coastal Plain, a population which, on the whole, increased up to 1820. The succeeding maps show a rather rapid movement of the slave population to the

* Myer Jacobstein: "The Tobacco Industry in the United States." Columbia Univ. Studies in History, Economics and Public Law, Vol. 26, No. 3, 1907.

† Cairnes, *op. cit.*

‡ Jacobstein, *idem.*



FIG. 10.

The Coast of North Carolina. (From maps of the U. S. Coast and Geodetic Surv.)

Piedmont and a progressive increase in this division from the North southward; a kind of slave wave, so to speak, passing southward. The small planters and non-slave-holding farmers were forced westward. The migration of slave owners who were largely from the Tobacco South, is shown as early as 1800 when slavery was well organized in the Louisville and Nashville Basins. From about 1830 on, both the Tidewater Region and the Piedmont of Virginia became

a slave raising rather than a slave working region. By 1840, the Coastal Plain was largely given to the cultivation of cereals. Fig. 12.)

The Piedmont in North Carolina held its density up to 1850 and, in fact, well through the slavery period. This area was within the cotton belt and was also a notable tobacco district. The Piedmont soils endured the exhaustive tobacco cultivation much better than did those of the Coastal Plain.

(To be continued.)

RAILROAD DISTANCES IN NEW YORK

BY

A. E. PARKINS,

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Extending east and west across the State of New York, from Lake Erie almost to the Massachusetts boundary, between highlands to the north and to the south, is a narrow strip of land nowhere much over 500 feet above the tidewater. The east end of this depression opens out upon the valley of the Hudson, which runs almost at right angles and which even as far north as Albany is almost at sea level. This natural outlet for the traffic of the West has the greatest railway mileage, for its area, of any other region in the State, and perhaps in the United States. Along this route we see (Fig. 1) quite a number of roads extending for the most part parallel to each other, concentrating into a narrow belt in the Mohawk Valley, but again spreading out along the Hudson. Along this route the people are so well supplied with transportation facilities that in 96 per cent. of the area no point is more than five miles from a railway station. To the north in the Adirondacks the conditions are far different. Fig. 2 shows large areas more than five miles from a station, and the small black spot near the center of the large area shows that a portion is even more than twenty-five miles from any shipping point. To the south, for the most part, the patches are small though numerous. That means a larger number of railroads and a better distribution. In the Catskills, however, there is a thinning out of the railroads again as shown by the two areas that are more than ten miles from any station.

Using Tarr's* classification of the physiographic regions of the

* Tarr's "The Physical Geography of the State of New York," page 1.

State, estimating the areas of these regions and of the portions more than five miles and ten miles from a station, calculating the percentages from these figures and tabulating we have the following:

REGION.	TOTAL AREA.	MORE THAN 5 MILES FROM STATION.		MORE THAN 10 MILES FROM STATION.	
		AREA.	PER CENT.	AREA.	PER CENT.
Adirondack	17,000	6,900	41	3,000	17
Lake Plains	4,500	80	1.8	....	..
Mohawk	4,000	300	7.5	....	..
N. Y.-Penn. Plat.....	14,000	1,400	10.	....	..
Catskills	4,200	1,400	33.	200	5
Taconic	4,300	230	5.	....	..
Gneissic Highland	1,000	10	1.	....	..
Long Island	1,000	10	1.	....	..
Total	50,000	10,330	20.	3,200	6

The remarkably poor development of railroads in the Adirondacks and the Catskills comes out in this method of treatment. Over 40 per cent. of the area of that portion of New York between Lake Ontario and the eastern boundary is more than five miles from a shipping point. In the Catskill region the development of roads is almost as poor when areas are considered. Here the figures show that in 33 per cent. of the area there are no stations within five miles. The lack of railroads in these two regions is further brought out by the percentages shown in the last column of the table. Here we see that 17 per cent. of the area of the Adirondack region and 5 per cent. of the Catskill region are distant more than ten miles. The low percentage for the remaining regions of the State shows a better development. The low percentages for the regions along the Lake Plains and the Mohawk and Hudson River valleys are not surprising in view of the great development of railroads shown by Fig. 1. The larger percentage for the Mohawk region is perhaps due to the concentration of the roads along the Mohawk River and to the fact that the physiographic boundaries of this region are very indistinct,* so that portions of the Adirondack region on the north are classed as belonging to the Mohawk.

Topography has had a great effect in determining the distribution of the railroads in New York. The low pass offered by the Mohawk depression makes it the great transportation route for all time. Trail, wagon road, canal, and railroad followed each other. Each had its effect in bringing in industries and people. But the railroad has been and is the greatest factor. The increase in transportation facili-

* Tarr's "The Physical Geography of New York State."

ties offered by it has favored industries; more industries meant more people; and these in turn meant more railroads. Cause and effect here are reciprocal. These factors, human and natural, have concentrated railroads, industries, and people to such an extent that "four-fifths of the population and nine-tenths of the wealth of the Empire State are found within the countries bordered or crossed by the Hudson River and the Erie Canal." *



FIG. 1.

In the Adirondacks, topography has not been the sole factor, for while the highlands have had their effect, no doubt, the area more than twenty-five miles from a station is not in the highest part but far to the southwest, near Lake Pleasant in Hamilton County. This odd arrangement is due to the fact that the highest parts of the Adirondacks are the playgrounds of the wealthy New Yorker, and to reach these recreation grounds the railroads push out branch lines as

* Brigham, "Geographic Influences in American History."

far as topography will allow. From the northwest the Delaware and Hudson has projected a line as far as Lake Placid, within fifteen miles of Mt. Marcy, the highest point in the Adirondacks and about five miles from Whiteface Mountain. To reach this vantage point a branch from the main line along the west shore of Lake Champlain has been carried around the north base of the Adirondack mountain pass. But for the summer passenger traffic, the railroad mileage in



FIG. 2.

the Adirondack region would be far less. Here human causes have served to counteract natural ones, but the natural have been the more effective. In addition to topography, two other causes may be cited as perhaps having a great effect in hindering railroad development, namely, thinness of soil and remoteness from east and west traffic. But in the southern part of the State, relief has the greatest effect.

The deep valleys and numerous hills in the Catskill region have

hindered railroad building, as they have in the New York-Pennsylvania Plateau, although not to such a great extent in the latter region. But even here the elevations reached and the grades that must be climbed are far in excess of those along the Mohawk route. The route over this plateau from Buffalo to New York is much more direct, yet we see no such development of railroads as shown by either accompanying map.

The principle of construction of this Railroad Distance map is not an original one. Tronnier* has recently published a map of north-west Germany in which he shows areas more than five kilometers, more than ten kilometers, and more than fifteen kilometers from a railroad. The boundary lines of the areas on his map are drawn parallel to the railroad at a distance of five, ten, or fifteen kilometers for each respective area. In the accompanying maps of New York the general plan of Tronnier's map has been followed, but instead of showing distances from the railroad the map shows distance from the railroad stations. The construction of such a map is a simple process. From the various stations shown in an official railroad map of the State, as centers, arcs are drawn having radii of five, ten, fifteen, twenty or twenty-five miles. The areas outside of the intersections of the five-mile arcs are more than five miles from the stations.

Taking the State as a whole only 20 per cent. of its area is more than five miles from a railroad shipping point and but 6 per cent. of the entire area is more than ten miles. Hence we may say that 80 per cent. of the people of the State of New York are living less than five miles from a railway station. It is south of a line from Albany to Lake Ontario that we have the greatest development of railroads. Over 90 per cent. of this area is less than five miles from a shipping point. In this region we find the greatest densities of population, more cities, more wealth per square mile, more schools, more colleges, and more of everything that indicates culture.

**Petermanns Mittheilungen*, May, 1910. "Eisenbahn Ferne von Nord Deutschland. Von Rich. Tonnier.

THE SPITZBERGEN EXCURSION OF THE INTERNATIONAL GEOLOGICAL CONGRESS

BY

PROF. R. S. TARR
Cornell University

Among the many excursions undertaken by the International Geological Congress at the Stockholm meeting last summer, none were more pretentious or more successful than the excursion to Spitzbergen. Boldly planned, skillfully managed, and successfully carried out in practically all of its details, it was a memorable expedition. On this trip the party saw Sweden from Stockholm northward into Lapland; they cruised along a large part of the Norwegian coast; and they spent a week in Ice Fiord in Spitzbergen studying the complex geological structure, and the glacial phenomena. The expedition was planned by Professor Gerard DeGeer, who accompanied it as director and who gave freely to us all from his vast store of knowledge. To him, and to his accomplished wife, each member of the excursion came away feeling a debt of gratitude. It was a wonderful opportunity to see an interesting and far away region under the guidance of one who knows it so well; and to discuss the problems not only with him, but with other geologists and geographers of wide experience and knowledge. There were about seventy in the party, representing some fifteen nationalities, and including such well-known geologists as Credner, Penck, Wahnschaffe, Rothpletz, Keilhack, Saloman, Sapper, de Margerie, Madsen, and Reusch. English-speaking geologists were few in number, for there were but three from the British Isles—Cole, Lamplugh, and Strahan; one from Canada—Coleman; and four from the United States, these being, in addition to the writer, Miss Bascom of Bryn Mawr, and Miss Baker and Miss Rice of the University of Chicago.

It is difficult to select from among the multitude of observations with which each day was crowded, those which, because of their special noteworthiness, deserve mention in a brief note such as this. Surely all were impressed, in Sweden, by the clear evidence that from an ice center in that country the continental glacier spread westward, ascending the Norwegian divide, and, in its waning stages, holding up extensive marginal lakes which outflowed to the Atlantic

across low passes in that divide. Impressive also was the record which Professor and Madame DeGeer have worked out, at Ragunda, of the time which has elapsed since the glacier receded from this part of Sweden. The diversion of the outlet of a large lake brought about its drainage; streams have dissected the lake and still earlier fiord sediments; and the annual layers there revealed have been painstakingly studied and counted, giving basis for an estimate in years of the time since the ice stood there. To many it was a surprise, and to all it was a matter of interest, to see the vast iron deposits at Kiruna in Lapland, and to observe in its Norwegian seaport, Narvik, the preparations for the shipment of this ore, which seems destined to play an important rôle in the iron industry of the world.

The quaint Laplanders, the beautiful fiord scenery of the Norwegian coast, the midnight sun, and the Arctic floe ice, were all new to most of the party and were a source of pleasure to all. But the great climax was Spitzbergen itself, where we had a week of busy days not bounded by sunrise or sunset, and some of them fully twenty hours long. Here we had the experience of gathering ferns and other Tertiary plant fossils from the moraines on glaciers; here we stood at the mouth of a coal mine, accumulated during a period of far more genial climate, and looked out over a waste of barren Arctic landscape and upon vast snow fields and glaciers from whose fronts icebergs were crashing into the sea. One could not wish for more convincing testimony of climatic change; it required only the slightest imagination to picture this desolate land the seat of luxuriant vegetation which is now forbidden it.

The geologic structure, in which rocks of almost every age from early Paleozoic to Quaternary are involved, and in various attitudes and relationships, with faults, folds, igneous intrusions, and unconformities, is revealed in almost diagrammatic simplicity in the steeply rising walls of the branching fiord, every branch of which we visited with frequent landings, and with convincing expositions from our leader. The topographic forms were a source of great interest to the physiographer for we found here a rock structure quite unlike that of well known regions of former glaciation. The processes and results of glacial erosion exhibited here were, therefore, new to most of us, and the phenomena were masked by the extensive gullying and talus deposit to which the steep slopes of horizontal or slightly inclined sedimentary strata had been subjected. There had developed a topography strikingly simulating that of an arid plateau region, like that of southwestern United States; the climate of Spitzbergen

is, in fact, an arid climate. To me, of all the phenomena observed, those of the glaciers were of most interest, but I shall resist the temptation to dwell upon the many features of importance which they present. We are promised a full report on these glaciers by Professor DeGeer, who has studied and mapped them on his several expeditions.

Our little steamer left Ice Fiord under steam generated by Spitzbergen coal, and with it made its way to Norway. The islands are to-day a "No-Man's Land," but the presence there of extensive workable beds of coal in latitude 78° N. gives to this land, though far within the Arctic Zone, a new importance. Already, at the American coal mine, there is permanent settlement, and extensive development has been carried on. It was a wierd experience to find a "Longyear City" in this far northern land, to be conducted through a frozen coal mine by an American engineer, and to have a foreground of electric wires, and railway tracks with an ice cap background.

THE RUBBER WORKERS OF THE AMAZON

BY

A. LANGE.

In the State of Amazonas, excluding the City of Manaos, probably 150,000 men are directly occupied with the rubber trade. They are proprietors and workers. The proprietors, whether foreigners or Brazilians, have now adopted modern methods both in the working of the rubber and in its commercial manipulation. Not more than seven or eight years ago, the actual tapping of the rubber tree was conducted in such an unintelligent manner that enormous losses resulted through the killing of the trees. They are now tapped scientifically and the new method is enforced on all important rubber estates. Formerly the rubber was smoked with certain materials and in such a manner that the health of the operator was seriously affected after a few years' work. By the modern method no danger whatever is involved in the smoking process. Not only in the technical phases of rubber collecting but also on the business side of it they have improved their methods. They now, for example, employ expert bookkeepers, if not competent themselves in this line.

The proprietor living at a great distance from Manaos, often

suffers large losses through fluctuations in the rubber-market because the market quotations do not reach him for two to three months. Thus he may ship 10,000 to 15,000 pounds of rubber and, a month later, the news may come that a big drop in price has occurred. If he had known this he might have held his rubber for a rise in the market. The small river launches receive the news from the steamers of the Amazonian Steam Navigation Co., which ply on the main streams. In this way all information reaches the rubber districts of the upper Amazon.

An average rubber estate extends as a narrow band on both banks of the river and is often fifty to seventy-five miles long. It stretches two to three miles into the forest, but seldom more, as the rubber trees grow only near the river front. Along this narrow stretch of land the camps of the workers are distributed, the headquarters generally being located centrally so that the workers, living at the extremities, can cover the distance from their camp to headquarters in a day and a night. They travel, of course, by boat on the river.

It is the custom on some of the largest and best regulated rubber estates for the workers to assemble every Saturday night at the office, at headquarters, to report the amount of rubber collected and smoked during the week. The amount varies greatly. Many different factors influence the weekly output, such as the poor health of the worker or, as is often the case, his disinclination to work. Weather conditions also play an important rôle in the tapping of the milk. Few workers report a full week of labor. An average working week taken from the reports of eighty-seven men proved to be four days. One or two days with fever or some other disease, or two days with continuous rain and the average of four days is reached. In one camp I observed that the worker, who was a powerful Indian, had made some marks on a piece of board with a burnt stick. He informed me that every time he put in a day's work he made a mark. There were in all forty-eight marks. This was July 5, and he began work on January 1.

A launch comes up to this remote part of Brazil once a month with merchandise and returns down the river with rubber. Shortly before the arrival of the launch the manager makes a canoe journey from one end to the other of his estate and weighs the rubber pellets that are awaiting shipment in the camp of each worker. Then all the rubber is carried to headquarters and placed on the river bank ready for shipment.

The manager pays his workers 6,000 reis for each kilogram; in other words a dollar for each pound of smoked rubber, and sixty

cents for each pound of caoutchouc. The monthly amount collected from each rubber worker is then checked up in an account-book payable to the worker whenever he wants to leave the employ of the manager. However, another little item has to be straightened out before he can leave and that is the account of the merchandise he has purchased. It may be taken for granted that the proprietor is not losing anything. He always has a store in connection with his headquarters. The employees are bound to buy from him, as there is no other store within a radius of a great many miles. Their daily supply of farinha, sugar, coffee, rice and beans, as well as their tools, rifles and ammunition, not to forget medicine and articles of clothing and luxury, all have to be purchased at this store and at prices that are absolutely staggering, though perhaps not so excessive if the locality is taken into consideration. I give here prices as now quoted in the store of Col. R. da Silva, whose estate is on the river Itecoahy, in the Javary region:

One box of sardines	\$1.20
One pound of unrefined sugar .....	.30
One roll of tobacco (retails in Para for \$4).....	21.30
One basket of farinha (retails in Para for \$4.50).....	13.30
One bottle of ginger-ale .....	.60
One pound of potatoes .....	.60
The cheapest cloth with stamped pattern, per yard.....	.90
One Collins Machete (N. Y. price \$1).....	\$8 to 10.00
One pair of men's shoes (N. Y. price \$2.50).....	11.60
One bottle of very plain port wine, 22,000 reis	7.30

Outside of the store is a sign, saying that any employee who owes the house more than 4,000,000 reis (\$1200), cannot make purchases exceeding 1,000,000 reis, that is, \$300 per month.

The question of debt is by no means an unimportant one to the rubber worker. When he gets employment as a worker on an estate, he is called "Brabo," which means that he is "wild" or unacquainted with the estate and its many estradas. He is, therefore, put in charge of a small estrada, very likely one that nobody else wants, because it gives little or very poor milk. He will probably collect one pound of rubber milk a day and will undoubtedly consume in material and supplies about \$4 to \$5 a day, so that after three or four months he owes the boss \$400 to \$500. Very likely, for the rest of the year he will keep abreast of expenses, barely managing, by working from 4 in the morning to 6 at night, in all kinds of weather, to earn as much as he eats and uses. The next year he may have the misfortune to fall sick so that he cannot work for a half year; his debt will then have run up to about \$1,000. How-

ever, the manager keeps him as he knows that the "Brabo" will get well some day and work off his debt. If he dies, then his debt is put in the "loss" column, after the profit on the purchased merchandise has been subtracted. Some very industrious workers, good rifle-shots and handy with bow and arrow in shooting fish, often manage to save considerable money, a few years giving them an account of \$3,000 to \$4,000. They will then leave the service and descend the river to Manaus, where they live as "gentlemen of leisure." Nothing less than champagne and the swellest hotel are good enough for them. These men, who have spent all their lives working in the forests doing the hardest and most trying kind of work, will now in three or four weeks spend several years' earnings, barely leaving them enough to buy a steerage ticket back to the woods.

Here are a few figures which will throw some light on the profits and expenses connected with the running of an average rubber estate. I have chosen the estate of Col. R. da Silva as, in size and output, it may be called representative. The annual output is about 100,000 pounds of rubber. Allowing for fluctuations, the sales amount to \$200,000 and the wages paid to employees to \$60,000. The store connected with this establishment is supplied from wholesale dealers at an annual cost of \$33,000, yielding, in reselling to the workmen a net profit of \$24,750 gold. The total net profit of the house is \$164,750.

The demarcation, by a Government engineer, of the estate is remarkably expensive and has to be paid the first year. In this case it amounted to \$78,000. The annual taxes are: government, \$18; municipal, \$60; state, \$150.

THE ECONOMIC IMPORTANCE OF THE PLATEAUS IN TROPIC AMERICA*

BY

PROF. J. RUSSELL SMITH
University of Pennsylvania

The mathematical limits of the Torrid Zone cause the tropic regions to receive much undue credit, because high altitude extends the Temperate Zone in the form of mountain and plateau islands which

* This suggestive paper, read before the Eighth International Geographical Congress, in 1904, and published in its *Proceedings*, has been revised and expanded by Prof. Smith for the *Bulletin*. It is printed here in the belief that its facts and opinions are of timely interest in view of the rapidly growing attention to tropical America.—THE EDITOR.

rise above the surrounding tropics. These far flung outliers of the north are too often counted in with regions of their latitude which thus get unmerited credit in many economic considerations.

If those parts of the tropic latitudes that do not possess tropic climate or yield tropic products were excluded from our consideration of that Zone our ideas of it would be materially modified. This is especially the case in America.

The plateaus and plains of tropic America offer an interesting paradox in their relation to the foreign commerce of those regions. The highlands are the chief seats of population; the lowlands are the natural, and, indeed, the only place for the production of most of the large and increasingly important list of staples for which the non-tropical regions depend upon the tropical. Here is a vast field for ethnic and industrial readjustment by which the people should relocate themselves where they can have access to the best resources and those fitted to produce the most universally desired products.

A survey of that half of the American continent lying between the Rio Grande and the Rio de la Plata shows a topographic distribution of dominant population groups, population that is the exact opposite of that prevailing in the temperate parts of the Americas, of Europe, and of Asia.

In North America the early colonists established themselves on the Atlantic plain, gradually worked up the valleys of the Atlantic rivers, and thence westward into the basin of the Great Lakes, to the valley of the Mississippi and its northern extension, which is fast becoming the seat of empire upon the continent. Along the Pacific coast similar conditions were repeated. The valleys of California, Oregon, and Washington contain nearly all the population of those States, leaving large areas outside with very scanty population.

In Europe the dense populations are on the good lands of the great low plain extending from the Pyrenees to the Urals, and in the valleys of the Po, the Danube, and the British rivers. In Asia the great majority of the people, possibly nine-tenths of the population of the whole continent—half the people of the world—are crowded into the lowlands of the monsoon countries between the Indus and Manchuria and northern Japan. Upon these lands the summer monsoon rains make possible the growth of heavy summer crops. In overpopulated Japan agriculture is practically limited to a paltry 15 per cent. of the land, a mere fringe around the edge of the mountainous isles, where irrigation water can be secured from the mountain streams which flow across the narrow plains to the sea.

Throughout tropical America the centers of population are, with

few exceptions, upon the interior highlands, and 99 per cent. of the vast area of lowlands skirting the two oceans, and sometimes reaching the interior of the continent, is unsettled, unused land. Instead of being the home of peoples, as in the temperate lands, it has always been a bar to settlement, and is to this day a hindrance or a prohibition to commerce and a vast land reserve of great but unknown possibilities for a more resourceful future to utilize.

In Mexico the geographers usually classify three zones—the cold, the temperate, and the hot, corresponding to the plateau, the slopes, and the low plains. Upon the first two are centered nine-tenths of the people. The plateau has in some sections a population as dense as that of France, and, considering its aridity, is really overpopulated, and the pressure of people upon subsistence is causing an alarming denudation of the rather scanty forest growth. Aside from the small seaports, the lowlands have a sparse population of planters, wild Indians, lumbermen, and other forest workers. A few new plantations have also been started there, and this new work, in conjunction with recent railroad building, has created a demand for labor that can be met only by importing laborers from the plateau; and one of the needed reforms of the Government is to stop the carrying away of the highland dwellers to involuntary servitude in the lowland forests. The profound climatic difference between the temperate Mexican plateau and the tropic lowland is evidenced by the dread that the highlander has of the lowland where he so often perishes like any newcomer from a cool climate.

Central America is still more pronouncedly a plateau country. The heavy rains from the trade winds give dense forests to the slopes and reduce much of the coastal plain to swampy jungle. The Atlantic plain being wider than the Pacific, the plateau between the double mountain ranges to the west was more easily reached from the latter ocean, from which it was settled and through whose ports its commerce was for more than three centuries almost exclusively carried on. In recent years coastal settlements along the Caribbean have grown through the rise of the banana industry, and Costa Rica and Guatemala have shifted a part of their commerce to the east through the opening of railroads to Caribbean ports; but for the majority of its population Central America is still, economically speaking, a Pacific country, because the centers of population, being upon the plateau, lie nearer to that ocean and use it as their highway to the outside world.

The Pacific coast of South America shows in the main the same plateau predominance. The marine plain from Panama to central

Ecuador is wet, forest clad, and, except in some unwholesome ports, is populated only by a few wandering Indians. Ecuador consists of a fertile low plain, containing one-fourth of the population, and a high, isolated, and hilly plateau between the ranges of the Andes, upon which the remaining three-fourths of the people are crowded, and an interior tropic low plain teeming with beast, birds, insects and fish, an overgrown jungle of vegetation so hopeless of passage that it is trackless. The great majority of Ecuadoreans, the plateau dwellers live by growing corn, beans and wheat, and keeping cattle—temperate zone agriculture. Peru presents a similar arrangement of humanity, with a comparatively dense population upon a plateau so high that at times men wear woolen masks to protect their faces from the cutting winds. The Peruvian coast lands have a greater development than any other in tropical America, owing to the aridity and healthfulness of the desert and a water supply from the Andes to support agriculture by irrigation.

In northern South America the outlying ramifications of the Andes mark the limits of the really peopled districts. Colombia, drained by the splendid Magdalena, uses that river as a means of communication to cross the malarial desert that lies between the sea-coasts and the isolated plateau settlements. The great moist valley of this river lies almost untenanted. Venezuela has a similar condition, but fortunately her plateaus, centering around Caracas, are nearer the sea. The Orinoco drainage basin with tens and hundreds of thousands of square miles of grass and forest lands, has a few feeble settlements supplied by one trading steamer. This valley typifies the conditions of the interior of the South American continent. One of the world's greatest plains extends from the mouth of the Orinoco to the mouth of the Rio de la Plata and from the mouth of the Amazon to the foot of the Andes, a region that is double the area of the Mississippi Valley with its 40,000,000 people, or the Yangtse Kiang, with 150,000,000; but the South American land with its eight sovereign nations, is a land unknown. In northern Argentina, even outside the tropic, large rivers have never been correctly charted, and in the Amazon Valley American commonwealths could be lost to the world if put down in the midst of unexplored reaches of jungle that extend to the base of the Andes. Only the larger streams have been navigated by native and Portuguese rubber gatherers and a few scientific expeditions.

In Brazil the center of population is on the plateau lying inland from Rio de Janeiro and Santos and on both sides of the Tropic of Capricorn. In this area is the center of the world's coffee produc-

tion and the best-developed railway net-to be found in the Torrid Zone. The elevation of the district, in connection with its large latitude, however, rob it of full tropical climate.

The coast of Brazil has the largest seaports of tropical America—Rio de Janeiro, Bahia, and Pernambuco. These cities are all on a coast swept by the trade winds, and, excepting Rio, which is the national capital and the port for a large interior district, each is the center of a producing district of small area lying close to the sea and inhabited chiefly by a colored population. In British Guiana this coastal characteristic is more pointedly brought to attention, because nearly all the exports of this large colony are grown on a strip of alluvium diked and reclaimed from the sea after the manner of Holland. Furthermore, the coast settlements and cities from Rio de Janeiro to Guiana are largely populated by negroes or mulattoes, or, as in Guiana, by imported East Indian coolies.

The location of cities in tropical America shows forcibly the importance of the plateau. In temperate North America and in northern Europe there is no national capital that is not located on a low plain, many of them are seaports, and all can be reached from the sea by at least river or canal navigation. In all tropical America there are 11 independent nations, excepting Panama, and of the 11 but 1, Brazil, has a capital city that is also a seaport. Even the Brazilian capital is not fully maritime, since the suburb of Petropolis, on the escarpment of the plateau, is the real administrative center, the residence of the diplomatic corps and the Brazilian aristocracy, and has also a growing textile industry.

The other 10 capitals of the American Tropics are beyond the reach of any kind of navigable connection with the ocean, and are usually situated upon plateaus from 2,000 to 9,000 feet in elevation, where good drainage and cool and wholesome climate prevail.

The colonies of Guiana and Belize do not enter into this comparison, because they possess no available plateaus for capital sites. They are instead composed chiefly of endless jungle over which sickly settlements on a tradewind coast exercise a nominal jurisdiction.

This centering of city as well as country life upon the plateau leads to a peculiarity of cities which may really be called a division of city functions. In the Temperate Zone every seaport develops in time into a considerable industrial center, the productive industries often supporting more of the population than the purely commercial. Such is the case even with New York. In the greater part of tropical America these two services are separated, and the city may be

thought of as in two parts, one, the port, commercial, the other, upon the highland, industrial, administrative, and residential. In Costa Rica the capital, San José, has its port in Port Limon; Caracas has La Guaiara and Puerto Cabello, and Lima has Callao. Santos, Brazil, with 20,000 people, is the greatest coffee port in the world and the port for São Paulo, on the heights above, a thriving plateau city with population of over 200,000. Each of these ports is much smaller than the city for which it is the outlet, the ratio ranging from about one-third to one-tenth, or even less, the City of Mexico having about 350,000 people, whereas the population of Vera Cruz does not exceed 30,000.

The economic effect of this predominance of the plateau is that the population is located on the least productive lands, and commerce is handicapped by the great difficulty of reaching the sea. This difficulty at times borders upon prohibition, and it is prohibition for commerce in any modern sense of the word. The upland dwellers of Ecuador, for example, numbering hundreds of thousands, possibly a million, and including the residents of the capital of the country, were, until the beginning of railroad work recently completed, dependent for connection with the outside world entirely upon a mule trail, where life and property were often threatened with destruction by slipping from narrow rocks to abysses below. Another part of this same trail crossed the lowlands, which the rainy season often made impassable even for pack animals. This case is extreme in the number of people dependent upon a single route, but it is fairly typical of the conditions that separate a large proportion of the people of tropical America from the world's highway, the ocean. As a natural result of this isolation many of these people have almost no foreign commerce whatever. The statement is not made that any single country has no foreign trade, for they all have; but each contains a considerable share of people who have almost no part in this trade and who live in houses of local construction, some without an iron nail in them, eat home-grown food entirely, and wear clothing of the meagerest pattern, possibly of homespun, possibly of imported cloth.

This economic isolation is indicated by an examination of the products exported from these regions, for imports must be paid for with exports. By classifying them in two lists, we may see the relative parts taken by the highlands and the lowlands.

EXPORTS FROM TROPICAL AMERICA

Plateau exports.—Coffee, ores and metals, hides, skins, wool, cinchona bark.

Lowland exports.—Rubber, sugar, cocoa, bananas, cotton, tobacco, gold, asphalt, cedar, mahogany, dyewoods, cabinet woods, spices, sarsaparilla, vanilla,

indigo, cocoanuts, ivory nuts, brazil nuts, cochineal, fibres and bristles, cocaine and drugs, Panama hats, many miscellaneous articles in small quantities.

Staple tropical products imported by temperate peoples from Eastern Hemisphere.—Tea, rice, manila hemp, jute, varnish gums, pepper and other spices.

The plateau list is short, but is important in the volume and value of its articles. The lowland list is much longer, but no single article in it equals in importance the two leaders in the plateau column, coffee and minerals; yet as a group the lowland products are exceedingly important for modern commerce, and of great promise for the future. Only one of the plateau products, coffee, is really tropical, and it is not yet certain that its cultivation must be limited to plateaus. Some very suggestive experiments in coffee culture are being carried on at low elevations in Mexico. The ores and metals are natural mountain products in all climes, and the mountains in the countries under review are rich in minerals. The skins of cattle, goats, sheep, deer, and other wild animals are commodities of high value, good keeping qualities and easy transport, and together with some wool they make up the most universal basis of export from the plateaus, and along with metals pay for the meager imports of those regions which are not so fortunate as to grow coffee. It thus appears that many of the people within the Torrid Zone are trading exclusively in nontropical produce, and that the large majority of the population, those upon the plateau, have probably a small majority of the commerce, including but one tropical product of importance—coffee.

There yet remains a long list of really tropical and lowland products, the ones we think of when the word "tropic" is spoken, rubber, cocoa, sugar, banana, mahogany, dyewoods, and all the roots, fruits, nuts, drugs, extracts, and products of the forest, the palm, and the cultivated field. These much-sought products give a greater per capita foreign trade to that small proportion of the population living in the lowlands. The growth of the lowland population has not yet responded to the growth of the lowland trade. Almost without exception, the natural and cultivated products of the American Tropics are in increasing demand in North America and Europe, where they are required as food or as raw materials of industry. Moreover, several staples of the Eastern Tropics may probably, with proper industrial conditions, be cultivated in America, and rice certainly can be, although it is now imported by every country between Cape Horn and the Arctic Ocean. Suggestive examples of tropic crop introduction when labor conditions are suitable are furnished by the way the East Indies have wrested the cinchona industry from

South America and the successful competition of British India and Ceylon with the *Chinese* and Japanese tea growers following deliberate and systematic introduction of the industry by the British in their Colonies.

The needs of the world commerce require the products that may be produced in the lowlands of tropical America. Can the population of these regions increase in number and industry to meet these demands? Under the present condition it does not promise to do so, but there are at least two ways in which it may become possible—one is by the introduction of Asiatics, accustomed to similar climate. This policy the British have tried in a small way successfully in some of their colonies, but the independent countries of the American continent have not yet made a success of that method.

The other means of peopling these lands is by the application of science to eliminate the tropical diseases that are now so fatal to white men and harmful to others. This is a possibility which is just arising, but which may rediscover to us the New World during the present century. Most of the particularly troublesome and so-called contagious diseases are now explained as due to or transmitted by the activity of animal organisms of various kinds. Once the danger is known it may usually be averted by combating some insect or germ or by inoculating the person so that the germs have no effect. Within the memory of living men smallpox has declined from the position of the world's greatest plague to a second-rate disease, due only to carelessness. The germ of typhoid fever is known and with care the disease can be controlled and prevented. Millions of our contemporaries have followed the steps by which mosquitoes have been proved the guilty agents in the spread of the dread and mysterious yellow fever, and the disease has in places been stamped out completely. In the same way the sleeping sickness of Africa is now known to be due to a variety of the tsetse fly, and malaria, the bane of tropics and lowlands everywhere, is now explained by science as another of the insect-carried diseases. As medical science has just begun systematically to study these questions, it is fair to presume, in the light of present progress, that the time is not far distant when it may be almost or quite as easy to keep free from disease in the Mexican plains, in the Amazon or the Magdalena Valleys, as in the Mississippi Valley.

If such a condition is attained, it but remains to so organize lines of transportation that it will be easy to travel from the hot lands to the nearest section of plateau, and so to organize society and industry that the vacations for men and recreation and recuperation

for women and children may be easily obtained upon some cool plateau, with which the Tropics abound. There the depressing effects of long-continued heat and humidity can be avoided. In this respect it will resemble the life in American cities, from which people migrate by the hundreds of thousands in the heated season.

This will give a chance for the working out of productive organization along lines similar to those which Mr. Benjamin Kidd declares to be inevitable if political organization ever comes to the tropics. It has already succeeded both politically and industrially in Java and parts of Sumatra and the Straits Settlements where the Dutch and English keep order while the millions of Malays increase and produce things we want. There the English and Dutch superintend the plantations and mines while the Malays, the Hindoos and the Chinese perform the labor that produces sugar, tobacco, tin, cinchona, rubber and other products that minister so satisfactorily to the physical needs of temperate zone dwellers.

Europe is now using and will continue to make continued and increasing use of the new knowledge of tropical control in the old world tropics. It now remains for some one to take up the policeman's duty in America, start the Malay, Hindoo and Chinese emigrant ship and organize the trained corps of northern superintendence. Overcrowded Europe has been able to find relief through emigration to North America. India and China are in far greater need of a place for overflow, but have not yet been able to reach it. The means for promoting this emigration are now at hand. Thus, and apparently only thus, can the Tropic American lowland come into any use during this century. If it is thus opened world population and world trade will experience a transformation of a magnitude witnessed but once before in the history of the world—the settlement and development of the Mississippi Valley. Millions of square miles of the most fertile land will be opened to the surplus populations of Asia, Europe and America, and the seat of empire in the American Tropics, as in the Temperate Zone, will shift to its natural place on the shores of the sea and the banks of great rivers. The thorough application of science to tropical agriculture can make these lands most productive. The present production on these lands is no index for the future, because science has not yet been applied extensively to tropic agriculture. World commerce will surge forward because of the production of commodities which can not be grown elsewhere and which are desired by men of all climes.

Without careful organization of production controlled from some cool office and supported on old world labor the scattering indus-

tries of the Tropic American lowland, have an uncertain future. The fate of the Chinese tea market and the South American Cinchona bark industry are suggestive of what the scores of millions of the tropic East can do when competing under European management with the few and feeble settlements of Indians and mulattoes and half-breeds who, under notoriously bad governments, are responsible for the present small produce of the Tropic American lowland. The only industries that can hope to escape the competition of the East are those yielding a perishable product like the banana which must originate near some definite northern market.

It therefore appears to rest upon the decision of Temperate Zone peoples whether or not the next half century witnesses increase or decrease in the relative importance of the tropic American lowland in comparison to the now dominant plateau.

A political objection may arise in some quarters. The independent nations of South America and Central America may wish to try the experiment of keeping their lands to be western, not Oriental. They may be fired by the desire to have them whitemen's lands, not yellow or brown or blackmen's lands. In such case, and it is far from hypothetical, there lie the European colonies in America, for which let us be grateful. British Guiana, with a population of less than three per square mile, of whom seventeen-eighteenths are colored, has no reason to yearn to be a whiteman's land, nor does the coolie-importing government have any such ambitions for it. Its 90,000 square miles, if fully tilled, would come surprisingly near supplying the world with all the tropical produce it now requires. The way, therefore, appears clear for an extensive trial of industrial colonization at any time that market conditions push enterprise into this opening.

NOTES ON THE DESCRIPTION OF LAND FORMS.—III.

MORPHOLOGIE DES BÖHMERWALDES. By Prof. Dr. H. Mayr. (*Landeskundl. Forsch. Geogr. Gesellschaft., München. Heft 8, 1910, 123 p.*) This painstaking and largely inductive study of a region, concerning which little modern physiographic information is to be had, may be taken as typical of a way of treating land forms which can be called the method of uncorrelated explanations; for, following the general genetic principle of the action of internal against external forces, announced in the introduction, the author proceeds to develop a number of theoretical and explanatory considerations, but without correlating them in a comprehensive evolutionary scheme. Detailed chapters on geology, climatology and hydrography occupy 77 pages; "Landschaftsformen" are treated in the remaining 44, with such sub-titles as tectonic valleys, erosional valleys, ridges and domes, etc.

The essay is of rather difficult reading, because so many independent and unexplained items are presented before the generalizations that combine and explain them are reached; this being a characteristic of the inductive method, in contrast to a method that begins with a concise explanatory statement, in view of which all items afterwards mentioned may be given their proper place and meaning as soon as they are encountered. The plan of treatment adopted by Mayr is, moreover, strikingly unlike that followed by Demangeon in his essay on the Limousin, reviewed in these notes last November, in which the scheme of the cycle of erosion was so fully adopted and so effectively used; for in Mayr's study the considerations usually associated with that helpful scheme are almost completely excluded. Their exclusion is to my reading a disadvantage, for it makes the descriptions of land forms less clear and the explanations given to them less secure. The lack of clearness and of security, as characteristic of the method of uncorrelated explanations, deserve special scrutiny.

The lack of clearness in Mayr's descriptions is seen in the uncertainty that remains in the reader's mind as to whether the generally subdued and waste-covered forms of the Böhmerwald highlands possess those rounded summits and moderate inequalities of height that characterize the late stage of a single cycle of erosion, in which all traces of forms developed in a former cycle are lost; or whether the highlands exhibit, as is so often the case in regions of greatly deformed and deeply eroded structures, broad-topped remnants of old forms developed in an earlier cycle, separated by young or submature valleys eroded during the current cycle. These alternative interpretations are worth examining, because the conception of the landscape that the reader gains from the observer's description must vary, according as one or the other interpretation is adopted.

The region consists for the greater part of schists and gneisses, striking northwest-southeast, and of massive granites. The chief deformations and intrusions are regarded as not later than Carboniferous, with subordinate and imperfectly specified dislocations of Tertiary date. Hence, as far as time is concerned, there has evidently been an abundance of it, since the period of strong mountain building and during the great degradation that the region has suffered, for the passage of several cycles of erosion, separated by successive uplifts without significant deformation. The question, however, that here stands open for the geographer to resolve is not whether successive cycles of erosion have taken place in the geological past, but whether traces of more than one cycle of erosion are visible in the forms of the geographical present. The readers of Mayr's essay have to try to answer this question by appealing, not to the facts, but to an expert's description of the facts, and it is the uncertainty which remains after this appeal is made which must be regarded as a lack of clearness, and hence as a disadvantage of the method of uncorrelated explanations.

The sufficiency of a single cycle of erosion to explain the existing forms of the Böhmerwald is implied in the statement that there is a gradual transition from the higher ridges and hills along the Bavarian-Bohemian boundary north-eastward to the peneplain of middle Bohemia (p. 2); for from this it might be fairly inferred that the greatly degraded forms of the Böhmerwald are the subdued one-cycle residuals of the most resistant rocks in a region which, in its areas of weaker rocks farther northeast, has reached advanced old age. The sufficiency of one cycle is again implied by the statement that the systematic decrease of fall down stream in the graded rivers is to be explained by the advanced age of the mountains (108); for if, on the contrary, the valleys were of two cycle origin, a headwater stream might still retain the faint fall of a former old age, after a middle stretch had gained a steeper fall in a newly deepened valley of revived erosion. The same implication is once more found in the explanation—of doubtful validity, as will be shown below—of the so-called tectonic valleys (81-), which are treated as owing their form chiefly to the deformation by which the mountains were created; for if any forms due to initial deformation still remain, prolonged erosion in several cycles separated by successive uplifts becomes very improbable, if not altogether impossible.

On the other hand, the highlands are described as monotonous (6, 115), with flat-topped ridges (83, 118), often having summits of similar altitude (121), and in one locality expanding in a plateau-like surface of "unexplainable origin" (117). All these features so strongly suggest that a former cycle of erosion witnessed the production of a peneplain, which is now elevated and elaborately dissected in the current cycle of Böhmerwald evolution, that one would be justified in tentatively accepting so plausible a conclusion, were it not that no mention of it is made by the author. Absence of mention can

hardly be ascribed to unfamiliarity with the idea of cycles of erosion on the author's part, for he occasionally uses terms, such as mature (*ausgereift*, 109), that go with the cycle scheme; and he explicitly recognizes the occurrence of the peneplain of middle Bohemia, as above noted; and, as is well known, a peneplain is the penultimate member of the series of forms evolved in an undisturbed cycle of erosion. Hence, absence of mention of two-cycle forms would seem to indicate that the author did not regard the monotonous highland landscape with its flat-topped ridges as indicative of two-cycle explanation. But uncertainty must still remain in the reader's mind even on this point, because the author does not contradict the implication of two cycles, given in his empirical descriptions, by an explicit avowal of belief in the sufficiency of one cycle, and support his avowal with good reasons therefor. It is this uncertainty of meaning—the bane of many geographical descriptions—that the adoption of any thorough-going scheme of correlated explanations does so much to avoid.

Before considering the lack of security in uncorrelated explanations, let it be explicitly recognized that explanatory descriptions of any kind have been condemned by some conservative empirical geographers, because of the possible insecurity of their explanations. In view of this, it behooves every geographer who prefers an explanatory to an empirical method, to lessen its chances of error by every means in his power. One of the best means to this end is found in the correlation of explanations, for it may be fairly urged that if the separate explanations of many different facts can all be reasonably united in a comprehensive explanatory scheme, the probability of their correctness is thereby much increased. On the other hand, any one of a number of uncorrelated explanations may go astray, without disarrangement of the rest, and therefore with small chance that either the author or his readers can surely detect where the error lies. It is precisely this principle that is illustrated by reference to Mayr's treatment of the valleys of the Böhmerwald. Let it, however, be said at the outset of this discussion that the present reviewer has no personal acquaintance with the region concerned, and that the discussion is therefore limited to Mayr's presentation of the facts. Such a discussion may perhaps be called academic; but whatever name it deserves, it touches a question of method that is of fundamental importance in geography to-day, now that the treatment of land forms is passing from the old-fashioned empirical methods, to the newer fashioned, rational, genetic, explanatory methods. No one can read the current geographical journals without becoming aware that this transition is going on, a transition that is bringing about the establishment of the same evolutionary philosophy in geography that is already so strongly established in other sciences. We are indeed rather late in making a change that our geological and biological colleagues have made already; but we are surely making the change, and it is well that we should

make it with full understanding of its difficulties and its advantages. The clearness and security of any method of explanatory description therefore deserve examination.

The question now before us is whether the facts regarding the valleys of the Böhmerwald are more safely presented to the reader by what is here called the method of uncorrelated explanations than by a method of correlated explanation. Following the method of uncorrelated explanations, as it is employed by Mayr, we learn that the valleys of the Böhmerwald are of two kinds, tectonic and erosional. The chief tectonic valleys are explained as owing their origin to the great Carboniferous mountain-making deformation of the region (p. 81), and as therefore being closely related in trend to the structure of the highlands (84), but unrelated in size to the streams that drain them, and little affected by the work of their streams (81). Three examples of this kind occurring in steep monoclinal gneiss and mica schist (82) are characterized by a direct course between pronounced ridges of uniform lateral slope (84). On the other hand, the erosional valleys are regarded as essentially the work of water (80); but the valleys heads have been modified by ice (90-102). The chief erosional valleys are characterized by indifference to the strike of the rocks (107), by their small breadth (107), and by side slopes that steepen downwards to their base (83).

The difficulty in accepting these contrasted but uncorrelated explanations as safe and sufficient, is due to the absence of various considerations that must come to mind if one attempts to re-state the explanations in terms of a more fully correlated scheme of treatment. Under such a scheme, the principles of the life history of rivers and their valleys show that trough-like depressions may be initiated by deformation, but that such initial forms will be changed into true valleys by the processes of ordinary erosion. They show further that, while young valleys may be narrow and steep-sided, old valleys must be broad floored between faint side slopes and low divides; that consequent valleys, as Powell called them, are incised beneath the troughs and slopes of initial deformation, and that subsequent valleys are developed, as Jukes clearly explained, by headward erosion along belts of weak structure quite independent of initial form; again, that in regions of deformed structure and repeated uplift, subsequent valleys (including under this name, valleys eroded in a second cycle by revived subsequent streams, as well as valleys excavated in a first cycle by the headward erosion of such streams) may come to outrank consequent valleys; this important principle deserving the name of Löwl's law, after its first enunciator; that valleys which are eroded by streams whose courses are inherited, as Shaler phrased it, from an overlying simpler structure on an unconformably underlying complicated structure—the epigenetic streams of Richthofen, or superimposed streams of Powell, shortened to superposed by McGee—manifest marked indifference to structural strike; and finally that

the form of a region, as initiated by deformation, will be unrecognizably changed after a lapse of such a measure of time as the Cretaceous or the Tertiary period, because all the valleys will then have widened to the point of consuming the initial elevations.

With these well established characteristics of rivers and valleys in mind, it is evident that tectonic valleys, as defined by Mayr, correspond to little modified troughs of initial deformation in the above terminology, but it is by no means clear that the three examples, described as tectonic valleys in the Böhmerwald, are really troughs of initial deformation little modified by their streams. Surely the occurrence of these valleys in belts of gneiss and schist of Carboniferous deformation throws great doubt on such an origin. Are the valleys not more likely mature subsequent valleys of the *n*th cycle, their breadth being determined by the breadth of the weak structural belts along which they have been worn out, and therefore having little relation to the size of their streams; their direct course being determined by the direct trend of these guiding structural belts; and the uniform slope of their sides being a natural result of normal weathering and creeping on appropriate structures? But these suppositions cannot be tested, because no sufficiently detailed statements are made concerning the rocks of the valley floors and of the enclosing ridges.

As to erosional valleys, it is surely not possible to discriminate them from tectonic valleys on the basis of narrow form and steep sides. Valleys that are eroded on weak rocks will gain a mature breadth and openness, while valleys eroded in hard rocks still retain a youthful narrowness; but in time even the hard-rock valleys will be worn wide open. It may well be that the narrow valleys of the Böhmerwald are not tectonic; but it does not follow at all that the broad valleys are not erosional.

The moral of all this is, that as long as a discussion of tectonic and erosional valleys, or of any other groups of forms, proceeds independently of the generalized treatment of the region in which they occur, the discussion may seem acceptable, even though it is really insufficient. When such a discussion is tested by paraphrasing its results in the systematic terminology of a more comprehensive scheme, its insufficiency, if it be insufficient, will be brought forward. Hence, when a young geographer chooses and adopts one from among the several extant methods available for the description of the landscapes that he studies, there is a matter of some scientific importance at stake, and not merely a matter of tradition, of accidental habit, or of personal preference. The matter has indeed an objective importance, for the method of treatment will react upon and greatly influence the aim and scope of observational work. There is really a large principle here at stake; for the choice of method is really a choice between conservatism and progress. If the choice be in favor of the older fashioned empirical method, in the hope

of avoiding the dangers of explanatory methods, then one must abandon all the progress made in the explanatory interpretation of land forms during the last century, especially during the last half-century, when the leaders among our western geologists gave so high a standing to American geomorphology. If, on the other hand, the choice be in favor of an explanatory method, then all these helpful interpretations may be employed, and new ones may be searched for; but in this case let the explanations of the chosen method be as thorough-going and whole-souled as possible; let piece-meal work be avoided in favor of correlated work, in the conviction that the more fully all explanations are harmoniously combined, the greater is their probability of correctness, and the safer are the descriptions that are phrased in explanatory terms.

W. M. DAVIS.

GEOGRAPHICAL RECORD

THE AMERICAN GEOGRAPHICAL SOCIETY

THE DECEMBER MEETING OF THE SOCIETY. A regular meeting of the Society was held at the Engineering Societies' Building, No. 29 West Thirty-ninth St., on Tuesday Evening, Dec. 20, 1910. Vice-President Greenough in the chair.

The following persons recommended by the Council, were elected to Fellowship:

Samuel R. Betts,	Winfred R. Martin,
W. C. Brown,	Dave H. Morris,
J. Hull Browning,	John Neilson,
Robert J. Collier,	Miss Blanche Nevin,
George B. Dexter,	Adolph S. Ochs,
P. Maxwell Foshay, M.D.,	Pehr Olsson-Seffer, Ph.D.,
William Burton DeGarmo, M.D.,	Frederic Courtland Penfield,
Rev. Milo Hudson Gates,	John A. Power,
Samuel E. Hoffman,	Edwin N. Sanderson,
Carl Otto Lampland,	Louis Agassiz Shaw,
Enoch P. Lawrence, M.D.,	Henry A. Sinclair,
John MacGregor Littell,	Miss Henrietta C. Wemyss.

The Chairman then introduced Mr. C. J. Blanchard, of the U. S. Reclamation Service, who addressed the Society on "The Arid Regions of the United States and the Reclamation Service." A large number of stereopticon views were shown. Mr. Blanchard described a number of the more important enterprises and showed the transformation that is being made in parts of the arid area which have been turned into the finest of farm lands. Some of his striking pictures presented the same areas before and after the change wrought by the introduction of water.

The Society then adjourned.

AWARD OF THE SOCIETY'S MEDALS. The Charles P. Daly Medal for Geographical Research has been awarded to Dr. Grove K. Gilbert, the distinguished geologist of the U. S. Geological Survey. The inscription on the medal

reads: "Awarded to Grove Karl Gilbert, Explorer—Writer—Teacher, in recognition of his many notable contributions to knowledge in the field of physical geography. MCMX."

The Cullum Geographical Medal, has been awarded to Prof. Dr. Hermann Wagner, Professor of Geography, at the University of Göttingen, the oldest and one of the most distinguished geographers in the universities of Germany. The inscription on the medal reads: "Awarded to Hermann Wagner in Recognition of his Great Services to the Science of Geography as Writer—Teacher—and Cartographer, MCMX."

NORTH AMERICA

THE POPULATION OF THE UNITED STATES. The Census Bureau has issued a statement giving the results of the Thirteenth Census for the separate states. The figures and a comparison with the population of 1900 with percentage of increase, are as follows:

STATES.	1910.	1900.	% INC.	STATES.	1910.	1900.	% INC.
Continental U. S.	91,972,267	75,994,575	21.0	Nevada	81,875	42,335	93.4
Alabama	2,138,093	1,828,607	16.9	New Hampshire	430,572	411,588	4.6
Arizona	204,354	122,931	66.2	New Jersey	2,537,167	1,883,669	34.7
Arkansas	1,574,449	1,311,504	20.0	New Mexico	327,301	195,310	67.5
California	2,337,549	1,485,053	60.1	New York	9,113,279	7,268,894	25.4
Colorado	799,024	539,700	48.0	North Carolina	2,206,287	1,893,810	16.5
Connecticut	1,114,756	908,420	22.7	North Dakota	577,056	319,146	80.8
Delaware	202,322	184,735	9.5	Ohio	4,767,121	4,157,545	14.7
Dis. of Columbia.	331,069	278,718	18.8	Oklahoma	1,657,155	790,391	109.7
Florida	751,139	528,542	42.1	Oregon	672,765	413,536	62.7
Georgia	2,609,121	2,216,331	17.7	Pennsylvania	7,665,111	6,302,115	21.6
Idaho	325,594	161,772	101.3	Rhode Island	542,610	428,556	26.6
Illinois	5,638,591	4,821,550	16.9	South Carolina	1,515,400	1,340,316	13.1
Indiana	2,700,876	2,516,462	7.3	South Dakota	583,888	401,570	45.4
Iowa	2,224,771	2,231,853	...	Tennessee	2,184,789	2,020,616	8.1
Kansas	1,690,949	1,470,495	15.0	Texas	3,896,544	3,048,710	27.8
Kentucky	2,289,905	2,147,174	6.6	Utah	373,351	270,749	34.9
Louisiana	1,656,388	1,381,625	19.9	Vermont	355,956	343,641	3.6
Maine	742,371	694,466	6.9	Virginia	2,061,612	1,854,184	11.2
Maryland	1,295,346	1,188,044	9.0	Washington	1,741,990	513,193	120.4
Massachusetts	3,366,416	2,805,346	20.0	West Virginia	1,221,119	958,800	27.4
Michigan	2,810,173	2,420,982	16.1	Wisconsin	2,333,866	2,069,042	12.7
Minnesota	2,075,708	1,751,370	18.5	Wyoming	154,145	92,531	57.0
Mississippi	1,797,114	1,551,204	15.8	Alaska	64,356	63,592	1.5
Missouri	3,293,335	3,106,665	6.0	Hawaii	191,909	154,001	24.6
Montana	376,053	243,329	54.5	Porto Rico	1,118,012	953,243	...
Nebraska	1,192,214	1,066,300	11.8	Military and Naval..	.....	92,219	...

THE BADLANDS OF THE BLACK HILLS, S. D. The South Dakota School of Mines, at Rapid City, has just issued *Bull. No. 9* (Dept. of Geology) by Cleophas C. O'Harra, which supplies the need of a concise description of the Badland formations of the Black Hills region. The monograph of 150 pp., with many illustrations of restored fossil remains, is intended primarily for those who have had no training in geologic and paleontologic study, but who desire to gain an intelligent idea as to the meaning of the Badlands. The paper is therefore of a non-technical character for the most part. The scientific literature on this region is large and readers who wish to inquire more fully into the literature will find a list of the more important publications in this work.

HISTORY OF THE GREAT LAKES. A recent article by Leverett (*Twelfth Report Mich. Acad. of Sci.*, 1910, pp. 19-42) gives an excellent, brief outline of the history of the Great Lakes based in the main upon the work of others, but also upon his own studies. He points out that the land was at lower altitude

before the great ice age, and then briefly discusses the problem of preglacial drainage. No definite conclusion on this point is reached, but his general belief is stated as follows:

"It will not be surprising, if a proper evaluation of these factors would throw the balance of probabilities in favor of preglacial discharge of much of the Great Lake region to the Gulf of Mexico."

He says there is a great accumulation of drift south of the Great Lakes region, and states that the northern half of the southern peninsula of Michigan has a depth of 700 to 800 feet of drift on its higher parts, and that the entire southern peninsula has an average of about 300 feet of drift. Some of this drift comes from Canada, but an examination of it in Wisconsin, Illinois, Indiana, Ohio, and Michigan has shown that from 75 to 80 per cent. or more, was derived from south of the Canadian boundary, a large part of it coming from within or around the Great Lakes basins. The significance of this fact upon the problem of the effectiveness of glacial erosion in the basins of these lakes is noteworthy. A large part of the article is devoted to a statement of the successive stages of lake development as the ice dam withdrew toward the northeast. As to the origin of the lake basins Leverett says:

"It thus appears that the lake basins as we now find them are glacially modified lowlands, which have been loaded in places by drift, and in places eroded and weighted down by the ice. They are held up by rock and drift barriers to levels several hundred feet above their rock beds, the lowest, Ontario, being nearly 250 feet, and the highest, Superior, 600 feet above sea level, while the beds of all except Erie extend in places below sea level." R. S. T.

RECEDING SHORELINES NEAR BOSTON. Specific records of physiographic changes in America are rare, because the country has been settled so short a time. One such series is described by G. B. Roorbach (*Shoreline Changes in the Winthrop Area, Mass., Bull. Geog. Soc. Phil., Vol. VIII, 1910, pp. 172-190*). It is shown that Winthrop Head, a hundred foot sea-cliff on a drumlin, receded 36 feet from 1860 to 1908 or at the rate of 9 inches a year. Grover's Cliff, 70 feet high, retreated at the same rate as Winthrop Head from 1891-1898 and somewhat faster from 1903 to 1905. Beaches are also receding, one end of Point Shirley beach having been pushed back 120 feet since 1860 or two and a half feet a year. Channels have been narrowed by the growth of spits, Shirley Gut having been navigable by ships in 1632 though today it would probably be impossible. It was 1,000 feet wide in 1775 in contrast with 240-460 feet in 1860 and 95-280 feet in 1898, the depth of water decreasing from thirty feet in 1775 to ten feet in 1898. Some drumlins, as Cherry Island and Nix's Mate have been completely cut away by the waves since 1636, although their destruction began long before that time. L. M.

CENTRAL AND SOUTH AMERICA

BIOLOGICAL SURVEY OF THE PANAMA CANAL ZONE. According to *Science* (Dec. 16, 1910) a Commission, under the direction of the Smithsonian Institution, will investigate and report on the facts relating to the natural history of the Panama Canal Zone. When the Suez Canal was built similar studies were made concerning the natural history of that region. The fauna and flora of the Isthmus of Panama are rich and diversified and as collecting has been done only on a limited scale, a thorough survey is likely to afford new scientific information of much value. By the construction of the Gatun Dam, a vast fresh

water lake will be created that will drive away or drown most of the animals and plants and possibly exterminate some species before they become known to science, unless such a survey be made. Field parties will be sent to the Isthmus, at an early date and the expense will be borne by friends of the Institution.

PROF. BIGELOW GOES TO ARGENTINA. The *Scientific American* announces that Prof. Frank H. Bigelow, who recently resigned from the U. S. Weather Bureau has joined the staff of the Argentine Meteorological Office.

MAJOR FAWCETT RETURNS FROM BOLIVIA. Major P. H. Fawcett, of the British Army, who, in the service of Bolivia assisted in the determination of the disputed boundary between that country and Peru, reached New York on Dec. 6, on his way home. He and his party followed the river Heath for 300 miles, partly on foot and partly in canoes. Heretofore, according to Major Fawcett, the topography of most of the Heath River country has been merely conjectural, the map showing mountains where rivers should be placed and *vice versa*. In the *Bulletin's* report and map on the settlement of this boundary dispute (June, 1910) the Heath River is shown as forming a part of the new boundary, from the region of its sources to its point of junction, with the Rio Madre de Dios.

AFRICA

RAILROADS IN WEST AFRICA. A little over a year ago the Lagos Railroad was opened to Jebba, on the south bank of the Niger River, about 400 miles from its mouth. The success of this line, now connecting the most important port in West Africa with the middle Niger, is thus far phenomenal. The actual receipts for the first nine months of 1910 were \$945,000, and the total for the year was expected to exceed \$1,250,000, and to leave a surplus over working expenses of about \$500,000. The bridging of the Niger at Jebba, will probably not be completed for three years, but meanwhile, the extension of the line as far as Zungeru, about 150 miles, will probably be completed early next year. There is now every probability that through railroad communication will be established, as soon as the Niger bridge is completed, between the coast at Lagos and Kano, only eighty miles south of the French Sudan frontier, a distance of 737 miles by rail. An important branch line is also building to connect Baro on the Niger about 100 miles below Jebba, with the main line and thus with Kano, the chief commercial center in the Western Sudan. Another branch line will connect Bauchi, in Northern Nigeria, with the main line. The importance of this branch, 150 miles long, is that it will join the Port of Lagos and the Bauchi country, which is believed to be one of the largest alluvial tin-bearing districts in the world. The main line will pass through a vast region of great fertility, a large part of which, according to the reports of experts, can produce enormous quantities of cotton, equalling in quality, American Upland. (*United Empire*, Dec., 1910).

EXTENDING THE SUDAN RAILROAD. The railway south from Khartum which reached Wad Medani on the Blue Nile, early in 1910, was opened to traffic as far as Sennar, on Nov. 1. A bridge is now building across the White Nile at Kosti and the railroad will be extended westward from Sennar, across the bridge and thence to El Obeid in Central Kordofan. It is expected that ultimately the railroad will be carried southward from Sennar, circumventing the swamp region of the White Nile and forming a part of the Cape to Cairo railroad.

AUSTRIAN EXPEDITION TO THE SAHARA. *Petermanns Mitteilungen* (2 Halbband, 5 Heft, p. 255) reports that the Austrian African traveller Otto Artbauer started in October with an Austrian artillery officer, Lieut. Kraft, to make his way into the Tibesti region between Fezzan and Wadai. Tibesti is a relatively fertile highland inhabited by the Tibbu, who have an evil reputation for wildness and barbarity and whose country is very little known. Mr. Artbauer has already made several journeys in Mohammedan lands and is master of a number of African dialects as well as an Arabic scholar. The explorers expect to determine astronomical positions, collect meteorological observations, produce a good map and obtain material for the study of these people. After completing their examination of Tibesti they hope to cross Wadai, and then make their way through the Cameroons.

THE LATE LIEUT. BOYD ALEXANDER'S AFRICAN EXPEDITION. The French Expedition which recovered the body of this murdered explorer (*Bulletin*, p. 911, 1910) found his diary which he had written up within a day of his death. It appears from the diary that, after the explorer had ascended Mt. Cameroons, he explored the Manenguba Range and then started northward, through the almost unknown country, by Kentu, into Southern Nigeria, making collections and finally arriving at Ibo on the Benue River. Thence Lieut. Alexander proceeded along through dangerous country, by way of Yola to Maifoni, while his collector José Lopez, went around by Kano to buy camels for the long desert journey across the Continent. At Yola, the explorer had an attack of blackwater fever, but soon recovered and at the beginning of 1910, he started on the last part of his route through Wadai and Darfur to Cairo. As the *Bulletin* has explained, he met his death, in Wadai, (French Sudan) early last year.

ARCHÆOLOGICAL DISCOVERIES IN SOUTH AFRICA. Dr. Carl Peters, the well-known German explorer, claims to have discovered definite trace of the presence of the ancients of classical and pre-classical times in the gold mining districts of South Africa. "I was fortunate enough," says Dr. Peters, "to discover a tablet which, so far as I know, contains the first actual, ancient inscription found in South Africa. Former discoveries were not proved actual inscriptions but were stones bearing marks strongly resembling ancient Semitic writings. The tablet in question was found by one of my men in a slave pit to the south of Inyanga, north of Umtali (Rhodesia). The district contains hundreds of these pits, from twenty to twenty-five feet deep, in which the ancients kept their slaves. The tablet was made of cement, and had been cut in two, evidently while it was soft, the letters on it being in no way damaged. The characters look to me like Greek letters, but other experts say that they are Graeco-Phoenician. I take the tablet to be half of an ancient passport, one portion of which was retained by the master, and the other handed to the messenger. I also discovered, near Zimbabwe, a brass figure of Pan, six and a half inches long, very similar to the figures found at Pompeii, thus proving Greek influence in South Africa apparently at a later period than the tablet I spoke of. These and other discoveries are to my mind further proof that in South Africa there has been a continuation of different ancient civilizations." (*The Amer. Antiquar.*, Vol. 32, No. 3, 1910, pp. 172-3).

DEW AT KIMBERLEY. That clear skies are not essential for the formation of dew is shown in a recent paper entitled "Some Observations of Dew at Kim-

berley," by J. R. Sutton (*Sci. Proc. Roy. Dub. Soc.*, Vol. XII, No. 24, Jan., 1910). It is not in the clear, bright calm nights of the Kimberley winter that the most dew (or frost) is deposited, but rather in the relatively more clouded autumn. Taking all his observations, the author finds that there are 258 observations of dew with clear skies, 85 with a little cloud, and 177 when the cloud state is conspicuous. It is pointed out that it is only when the relative humidity is not high that the fall of temperature on a clear night greatly exceeds the fall under clouds. When the relative humidity is high, there is no greater virtue in a clear sky than in clouds, and dew forms under either, for radiation is pretty nearly as much retarded by the invisible moisture as by the clouds. The advantage of a clear sky is that dew begins to form more quickly. Dew-making, Mr. Sutton concludes, is not a function of the clearness of the sky merely, but rather of the dampness of the air and the length of the night. R. DEC. W.

ASIA

VANDALISM IN CHINA. Mr. Frederick McCormick, Secretary of the Chinese Monuments Society, Peking, writes to our Society with regard to vandalism in China. The depredations of foreign tourists, foreign soldiers, and especially foreign adventurers, after 1900, became such an abuse that the Chinese authorities took notice of it. The China Monuments Society was organized in 1908-09, for the purpose of arresting foreign vandalism in that country.

Vandalism in China, perpetrated by foreigners began to attract attention just after the Boxer war in 1900 and increased very rapidly with the opening of the railways. Foreigners were placed in touch with several important monuments and now the Ming Tombs near Peking, the birthplace of Confucius in Shantung, the ancient capital of Kai Feng Fu, the yet more ancient capital of Honan Fu or Loyang and other places are open to tourists. Mukden and Peking were earlier accessible by rail. Most of the stone figures in the famous Avenue of the Ming Tombs near Peking have been mutilated. The sculptures at the Ming Tomb in Nanking have graven in them the names of American warships and other names, and on this account the Navy Department has issued orders restraining American sailors from acts of vandalism in China. The commanders of the various foreign guards at Peking have also taken measures to prevent abuses by their soldiers. The China Monuments Society has secured the co-operation of the authorities of several governments to restrain their subjects and citizens, and even to punish acts of vandalism. Depredations upon monuments of great antiquity and value have been reported from the Summer Palace near Peking, from Jehol, Mukden, Sian-fu, and Hang Chow.

The notable attempt upon the Nestorian tablet at Sian-fu by a Danish traveller was fully reported by resident missionaries and has been frequently confirmed by the author of the attempt himself. The following statement by one of his auditors in a well known Club in Boston explains the nature of the depredation:

"At a smoke talk on his expedition to Sian-fu he told of this Nestorian Monument, and how, just as he was about to replace it with a newly cut one, it was removed to a place of safety."

In 1908, on account of the confessed intentions of this man to purloin the Nestorian Tablet at Sian-fu, one of the most cherished monuments of China, his intimidation indirectly of the Governor of Shansi, and other abuses and atrocities, the China Monuments Society was at once organized and has since

endeavored to place itself in touch with all right-minded men to secure their co-operation in enforcing its aims.

Severe measures must be taken against this class of travellers and adventurers, many individuals of which write after their names the titles of members of the foremost geographical and other scientific societies. They trade in these often meaningless appellations and in the periods between their exploits on the lecture platform and in the magazines and newspapers, they outrage in China the laws by which they are forcibly governed at home.

The China Monuments Society, especially desires the co-operation of foreign geographical societies, in order to outlaw "a class of charlatans and adventurers from all parts of the world who visit China and commit abuses that owing to extraterritorial law cannot be punished in China, afterward reciting in western lands their imaginary adventures misrepresenting the Chinese, and throwing discredit upon western civilization and its representatives in China."

POLAR

CAPT. SCOTT SAILS FOR THE ANTARCTIC. Capt. Robert F. Scott sailed from Port Chalmers, New Zealand, on his South Polar ship, *Terra Nova*, on Nov. 29, for the Antarctic. He hopes to establish winter quarters, near his old station at the foot of Mt. Erebus and also at King Edward VII Land, where, if possible, he will land a small party.

THE ANTARCTIC AGREEMENT. At the meeting of naturalists in Königsberg recently, Lieut. Filchner, gave further information about the second German South Polar Expedition, which he will lead to the Antarctic this year. To avoid collision with the third British South Polar Expedition, commanded by Capt. Scott, which has already started for the Antarctic, and the second Scottish South Polar party, commanded by Bruce, now preparing to go south, the three above named leaders made an agreement to cooperate and each to explore a certain territory. The plan is to send out only one German ship which will reduce the estimated cost of the expedition to about \$300,000. The proposed programme is as follows:

Scott will endeavor to penetrate from the Ross Sea to the South Pole and across the Antarctic land mass to Weddell Sea, while Filchner will advance in the opposite direction from Weddell Sea. If they meet, certain members of each party will join the other and they will then continue their explorations independently. It was agreed that the Twentieth meridian shall be the boundary between the German and Scottish fields of work, the Germans working west and the Scottish expedition east of 20° W.L.

When the German Expedition starts next summer it will go first to Buenos Aires and then to South Georgia, which, as a whaling station, has a plan for repairing ships and is thus a fine starting point for an Antarctic Expedition. Thence it will sail to the Sandwich group and on to Weddell Sea, where a base station will be erected. From this station, the Germans will start on their sledge journey through the Antarctic area and hope to decide the question whether it is a continent or a great archipelago. Filchner thinks of taking with him three automobiles of sixty horse power to use for transportation, if the ice conditions are favorable. His crew will consist of 25 sailors and 9 scientific specialists. The ship will be commanded by a Norwegian ice pilot who has made journeys into the North Polar area for twenty-five years. The *Deutchland*, as she has been named, is a whaler, 144 ft. long, 44 ft. wide, with a

capacity of 528 tons, gross. She runs 7 knots an hour, and has a triple hull insuring her against strong ice pressures. Early in December the *Deutschland* will be ready to take on cargo. (*Geogr. Zeitsch.*, Vol. 16, No. 10, p. 590, Leipzig, 1910).

SIR ERNEST SHACKLETON AND WILKES LAND. The following is copied from the *London Times* (weekly edition) of Dec. 16:

"We are informed that Lieut. B. E. S. Ninnis, 3rd Royal Fusiliers, is to be appointed for duty with Sir E. Shackleton's Antarctic Expedition. On March 19 last, it was stated in *The Times* that Sir Ernest proposed to go out again to undertake a stretch of exploration which was likely to be fruitful in results so far as our knowledge of the outline of the Antarctic Continent is concerned. Starting from Cape Adare, he proposes to proceed westward along nearly a whole quadrant of the continent to Gaussberg, the headquarters of the German expedition. Along this stretch of coast are to be found a number of names, such as Adelie Land, Clarie Land, Sabrina Land, and so on, given by the expeditions of about 60 years ago, but which remain nothing but names."

This region is Wilkes Land. The Antarctic area offers no more important field for exploration. Explorers who shall ascertain the nature of the region between South Victoria Land and Kaiser Wilhelm II Land, will render a service that must be performed before we can claim a good knowledge of the South Polar area. Nothing has yet been done in America to complete the explorations that Capt. Wilkes began. It would seem that no Antarctic field would be so tempting for American exploratory enterprise as this; and yet the expedition which, it is reported, will be headed by Capt. Bartlett and Mr. Harry Payne Whitney will, it is said, go to Coats Land as its base of operation, though Dr. Bruce, who discovered this land, intends to use it as a base for his coming expedition.

A later report says that Sir Ernest Shackleton hopes on his next expedition to circumnavigate Antarctica.

TEMPERATURE VARIABILITY IN THE ANTARCTIC. In the *Quarterly Journal* of the Royal Meteorological Society (Vol. XXXV, No. 152, 1909) Mr. R. C. Mossman discusses the "Interdiurnal Variability of Temperature in Antarctic and Sub-Antarctic Regions." The author considers the day to day differences in the mean temperature of successive days at a few places in the regions for which the necessary daily observations are available. The greatest mean annual temperature variability, viz., 5.9° , was recorded during the drift of the *Belgica* in the ice-pack, this high value being closely followed by a mean of 5.3° at the South Orkneys. In the Victoria Land region Ross Island and Cape Adare have a somewhat lower temperature variability of 4.5° , the values of the southern station being higher in summer and autumn, and lower in winter and spring than at the northern station. South Georgia occupies an intermediate position between a continental and an oceanic climate in its curve of variability, the mean monthly values varying according to the proximity of the pack ice. At this station the seasonal values show a small variation, and this is also the case at Ushuaia, in Tierra del Fuego. The variability at the Falkland Islands and New Year's Island is very small, pointing to the conserving influence exerted by the insular conditions which prevail at these places. The maximum variability occurs in winter, and the minimum in summer, at the three Antarctic stations as well as at South Georgia and the South Orkneys. The smallest variability at any season for any station occurs at the South Orkneys in sum-

mer, being only 1.4° . It is at this season that cloud amount and fog frequency are at a maximum while at the same time rapidly moving cyclonic disturbances are of infrequent occurrence.

R. DEC. W.

NATURAL HISTORY OF NORTHEAST GREENLAND. Vol. 45, of *Meddelelser om Grönland*, is devoted to "The Terrestrial Mammals and Birds of Northeast Greenland," by A. L. V. Manniche, the ornithologist of the expedition led by the lamented Mylius-Erichsen, in 1906-08. After the death of the leader Mr. Manniche also took charge of the study of the terrestrial mammals of the country. His report is printed in English and covers his study of the eight species of mammals found—the Arctic hare, the Arctic fox, the Arctic wolf, the Polar bear, the ermine, reindeer, the lemming and musk ox. The reindeer seems to have disappeared completely, in the regions visited, but innumerable finds proved the rich occurrence of the species in former times, though not farther north than Holms Land (Lat. $80^{\circ} 24''$ N.) where reindeer horns were found in old Eskimo huts. The number of musk ox seen was comparatively small, though many traces of it and parts of skeletons were found. In Greenland the ermine, as well as the lemming, are confined to the northernmost and north-eastern parts of the country. The Greenland ermine, chiefly lives on lemmings, pursuing and killing the animals in their subterranean passages. The polar bear is found at all times of the year on the floe ice and in the inlets, and more rarely on land. A considerable number of hares were shot and eaten during the sledge voyages and about 400 were consumed on the ship, during the two years' sojourn. Thirty-eight species of birds are described in the latter half of the book, which is enriched by many fine illustrations showing animal life with a number of excellent cuts, showing extensive landscapes in this region which the Mylius Erichsen expedition was the first to visit.

OBITUARY

COUNT ADOLPH VON GÖTZEN. Count von Götzen died in Hamburg, in November at the age of 44 years. He became known to geographers through his journey in East Africa, in 1894, when he discovered the Mfumbiro volcanic peaks, in the northwestern part of German East Africa and found that one of these cones was still active. This was the first information brought from Africa, as to the existence of active volcanoes in the central tropical region. He later served as military attaché to the German Embassy at Washington.

GENERAL

THE MILLIONTH MAP. Dr. Bailey Willis recently wrote to the Society: "Argentina, Brazil and Chile have pledged themselves to undertake their share of the preparation of the 1:1,000,000 map, according to the circumstances governing the progress of such work in each particular country. Chile has passed a resolution or statute pledging the country to the work. In the Argentine Chambers a similar resolution was pending when I left in September, and I have no doubt was passed. In Brazil, Dr. Derby has laid out the skeleton of a general map according to the international scheme and he proposes to fill it in by reconnaissance surveys. Chile and Argentina will probably proceed more slowly in the actual preparation of sheets, but such geodetic or topographic work as they are doing is of a good character."

A STATE-OWNED TRANS-ATLANTIC CABLE. A plan is under consideration for laying a state-owned cable between Great Britain and Canada. The *London Times* (Dec. 2, 1910) says that the project is to lay the cable along the route surveyed in 1860 by the *Bulldog* and *Fox* from Scotland to the Faroe Islands (225 miles) thence to Iceland (240 miles), thence to Cape Farewell, south end of Greenland (670 miles) thence to Hamilton Inlet, Labrador (510 miles). A cable charge is said to be practicable, which would reduce ordinary messages between Great Britain and Montreal to ten cents a word. The rate on Government press and deferred messages, would in that case be about five cents a word. The cost of carrying out this scheme is estimated at \$4,250,000. It may be added that the Government cable through the Pacific, between Canada and Australia is reducing its annual deficit every year, and it is believed that the deficit for the year ending March 31, 1912 will be only about \$140,000 to be made good by the coöperating Governments of the United Kingdom, Canada, Australia and New Zealand.

A GIFT FROM DR. CHARCOT. Dr. Charcot has presented his exploring ship the *Pourquoi Pas?* to the French department of Public Instruction. The vessel is attached to the Paris National Museum of Natural History and the *Revue scientifique* says that an annual grant of 10,000 francs has been made towards the maintenance of the ship, which will be utilized by the Museum for oceanographical cruises.

COLONIAL GEOGRAPHY. At the Centennial Celebration of the University of Berlin, Prof. Dr. Hans Meyer presented 150,000 marks to the University, to found an extraordinary professorship of colonial geography in that institution. He also presented to the Geographical Institute of the University 10,000 marks for the establishment of a department of Colonial Geography.

THE STUDY OF VULCANISM. At the International Geological Congress in Stockholm, Dr. Emanuel Friedländer, spoke of the establishment of an International Institute of Vulcanology in Naples. The purpose of the proposed institution will be to make it possible for the first time, to carry on without intermission, systematic investigations of volcanic phenomena. For this purpose, laboratories and instruments should be provided. It will be particularly important to carry out regular temperature measurements at various places on Vesuvius, its gases should be regularly observed and analyzed, and the local earth movements that are probably related to volcanic action, should be registered, both during periods of quiescence and during the activity of the volcano. The effort will be made to secure by Jan. 1, 1912, at least 1,500,000 francs, to provide the plant required and further to assure an annual income of at least 50,000 francs. Mr. Friedländer has subscribed 100,000 francs to the building fund and guarantees an annual contribution for ten years of 10,000 francs. All further contributions should be addressed to Emanuel Friedländer, Naples, Vomero, Villa Hertha, via Luigia, San Felice.

PRESIDENT OF THE ROYAL SCOTTISH GEOGRAPHICAL SOCIETY. The Earl of Stair has accepted the Presidency of the Royal Scottish Geographical Society. He succeeds Prof. James Geikie who has held the office of President for the past six years.

GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY)

BOOK REVIEWS AND NOTICES

AMERICA

Chez les Français du Canada. Les Émigrants—Québec—Montréal—Ottawa—Le Grand Ouest—Vancouver. Par Jean Lionnet. Troisième édition. 284 pp. Plon-Nourrit et Cie, Imprimeurs-Editeurs, Paris, 1908.

The author, who is President of the Canadian Society, in France, has traveled in Canada and made extended studies of that country. His book, now in its third edition, has proven its usefulness. It is excellent for general reading and especially helpful to those who visit Canada. Although the Canadian French are chiefly settled in Quebec, the whole of Southern Canada, from the Atlantic to the Pacific, is treated in the book.

The Yosemite Valley: Its History, Characteristic Features, and Theories Regarding its Origin. By Galen Clark. 8vo, 108 pp. and 21 illustrations. Nelson L. Slater. Yosemite Valley. 1910.

The complete protection early accorded the Yosemite Valley by Congress, and California, is something to be proud of and grateful for. This beautiful region is one of the choicest treasures of our natural inheritance, and every thoughtful book concerning it is welcome. The little volume here noticed possesses an additional value and interest because its author, Galen Clark, was for many years "Guardian of the Valley" and was also one of the State Commissioners. He was identified with the locality for a half century, and, leaving behind innumerable friends, he recently, at the age of 96, passed "Across the Range." This book was his last. There is a sympathetic introduction from the pen of his old friend, Ben. C. Truman, which briefly relates the career of the genial pioneer, and which is well worth reading. The views are artistically reproduced, and the text is to the point, presenting the traveler with an outline of the history of the valley, some clear descriptions of the great features, and also of the trees, shrubs and flowers. Several pages of hints for visitors should be noted by them before starting for the place. The various theories as to the origin of the valley are briefly related and the author presents one of his own. The frontispiece is a very good portrait of him, which will be valued by all who have known the valley and this noble denizen, whose word "was as good and unimpeachable as a bond." D.

The Riders of the Plains. Adventures and Romance with the North-West Mounted Police, 1873-1910. By A. L. Hayden. xxi, 381 pp., photographs, maps, diagrams, and appendices. A. C. McClurg & Co., Chicago, 1910. \$2.75.

Anyone who loves the West of our Continent and would know more of its fascination and romance, will be glad to read this book. Even those who have seen Western Canada only as revealed through the windows of the

Canadian Pacific trains are interested in the Northwest Mounted Police and know the great and gallant work these wearers of the scarlet tunic have done in keeping the peace over an enormous area of the Canadian Plains. The author of this book has lived in personal and intimate contact with the officers and men of this force and has spent much time at their posts in the wilderness. His book is not only an authoritative history of the Mounted Police, but is also a faithful presentment of these guardians of the wilderness in all the phases of their life and duty. The book is full of interest and devoid of sentimentality. Many of the mounted police posts are shown in the fine photographs.

The Panama Canal and Its Makers. By Vaughan Cornish. 192 pp., index, map, and 63 illustrations from photographs taken by the Author. T. Fisher Unwin, London and Leipzig, 1909. 2s. 6d.

The more thoroughly disinterested an author shows himself to be when writing about the Panama Canal, the more interesting his book becomes. Herein lies the permanent interest and value of this account of the canal works. Dr. Cornish took up the study of this subject without prejudices or prepossessions, not only because, as an Englishman, he stood "outside American party politics," but also (and this is by far the more important consideration) because he is a scientific student, not engaged in commerce or in political life. We note particularly the intelligent comments on the vital question of the defense of the canal (Chap. I, historical review, pp. 41, *seq.*); on the facilities afforded by the railway, which so long ago determined de Lesseps's choice of route (p. 30); on the canal as it is to be (Chap. II); on the future of the white race in the tropics (Chap. V), and on the shortening of distances by sea and the steamships now available, or presumably to be available after 1915, for canal transit.

In almost every instance the disposition is manifested to state impartially the conflicting views that are entertained in regard to such subjects as the best type of canal, the comparative healthfulness of the tropics and the temperate zones, etc. We must, however, regard as a blemish the author's failure to direct attention to that geological fact which bears minatorily upon the stability of the isthmus itself and of all works constructed thereon, namely, the dependence of the isthmus upon problematical conditions in the geosynclinal belt that extends along the west coasts of all three American continents. Geologically, Panama is as dependent upon the geosynclinal earthquake belt we have mentioned as, politically, the canal zone is dependent upon the United States. The book seems almost free from positive errors, though, of course, the "Milaflores" frequently mentioned should be Miraflores. The author's first words (introduction): "At the present moment the canal zone of the Isthmus of Panama is the most interesting place in the world," and the concluding words (p. 177): "I confess that after the canal zone most places seem only half alive, and I long to be back where one can watch human activities so great and so intelligent," are certainly pleasant to read and to repeat. We commend to the attention of the reader the clear and impressive statement of the advantages that may be enjoyed by the Atlantic and Gulf ports of the United States, as compared with English and other European ports, and the warning reference (pp. 166 *seq.*) to the absence of an American merchant marine trading with foreign ports. A better brief statement of what may be termed the distribution of benefits which should result from the shortening of ocean routes it would be hard to find.

M. W.

Brazil and Her People of To-Day. An Account of the Customs, Characteristics, Amusements, History and Advancement of the Brazilians, and the Development and Resources of their Country. By Nevill O. Winter. x and 388 pp., maps, 24 illustrations from original and selected photographs, appendices and index. L. C. Page & Company. Boston, 1910. \$3.

The most interesting chapter in this book contains an account of a visit paid by the author to an American colony—the Villa Americana in Brazil.

"At the close of the Civil War," he writes, "many Southern families, whose plantations had been devastated by the Northern armies, felt that they could not live again under the old flag. Proud spirited and unconquered, these brave Southern veterans, who had marched with Stonewall Jackson and the Lees and Johnstons, decided that they would leave the land that had given them birth and seek fortunes anew in a new land amidst new surroundings. Brazil appealed to the leaders of this movement because the plantation system was similar to that under which they had been raised, and slavery was legal in that land, which was still an empire. A few of them went as an advance guard and selected a site about 100 miles northwest of the city of São Paulo. A favorable report was made to those still back in the States, and it was not long before several hundred families had left their Southern homes and were making new homes underneath the Southern Cross. In all it is estimated that at least 500 American families located in that section of the State of São Paulo, Brazil, between the years 1865 and 1870. They came from Texas, Georgia, Alabama, Tennessee, and perhaps one or two other seceding States. . . . Many of the original members of the colony became dissatisfied and returned to their former homes. There are, however, 400 or 500 Americans still living in this colony, or within a radius of a few miles. A few have moved to other parts of Brazil and others have intermarried with Brazilians; but, in general, they have remained true to their Americanism. Some of the original families purchased slaves and worked their plantations in that way, until that institution was abolished in 1888. A few have prospered greatly, but many others have done just fairly well. . . . A Protestant church, called the Union Church, adorns one hill, and a school house, a conspicuous building, is in another part of the village. . . . The members of this colony are now Brazilian subjects, the younger ones because of their birth in that land and the older ones by virtue of a general proclamation. Few of them actually take any part in the politics of the land. All of them, of course, speak the Portuguese language, but use the English in their homes. They are still Americans at heart."

The author touches, rather lightly, almost every subject that has long been familiar to readers of the merely popular descriptions of travel in Brazil. The simple truth is, that some of the natural features in the territory of the greatest South American republic are intrinsically so splendid that each new effort, no matter how inadequate, to describe them is sure to have some element of value. Mr. Winter desires to convey an impression of the falls of Iguassú and Guayrá. Beginning with Iguassú, he says:

"A dozen miles away the smoking columns of mist which crown the falls are plainly visible, and its thunderous roar may sometimes be heard for twenty miles. . . . The first view of these magnificent falls in their solitary grandeur is inspiring. They have the same general shape as Niagara, and are fifty feet higher. The entire falls are more than two miles in width, with a number of islands dividing the cataract. . . . Below the falls are depths

which a hundred fathom line has failed to sound, and the natives call them bottomless. There is a triple leap of 320 feet, the last one alone being a drop of 213 feet over sheer precipices of dark rock. . . . Above these falls, on the Paraná, are the wonderful Guayrá Falls, 125 miles above the junction with the Iguassu . . . Below the Guayrá cataract the current piles up in the center with a corkscrew action and then dives down again into midstream. It returns to the surface in eddies which leap up twelve or fifteen feet in the air, making, as one scientific investigator terms it, 'rapids with which the whirlpool rapids of Niagara are a quiet duckpond in comparison.' One is lost in considering this frantic water-power here awaiting the harnessing by man." M. W.

AFRICA

Les Blancs D'Afrique. Par le Dr. H. Weisberger. Avec figures, cartes et photographies de types. xxxv and 405 pp. Octave Doin et Fils, Éditeurs. Paris, 1910. F. 5.

The author treats especially of the two principal peoples of North Africa, the Berbers, descendants of the Libyans, and the Egyptians. The studies in the past few years throughout the Sahara have brought to light many facts which Dr. Weisberger uses for the enrichment of this comprehensive discussion of the different peoples of North Africa, who are allied in blood to the white Aryan family.

Von Kongo zum Ubangi. Meine zweite Reise in Mittelafrika. Von Franz Thonner. xi and 116 seiten, 20 Textbildern, 114 Lichtdrucktafeln und 3 Karten. Verlag von Dietrich Reimer (Ernst Vohsen), Berlin, 1910. M. 12.

Mr. Thonner, Congo explorer and botanist, made his first journey to the Congo about fourteen years ago, and his work, "Im Afrikanischen Urwald," gave him reputation. In the present book, he sketches first the changes that he found in the Congo and then describes the new region, which he traversed on foot, between the Congo and the Ubangi, its largest tributary. He concluded his wanderings with a boat journey down the Ubangi. The description of his journey is followed by chapters on the characteristic flora and the various tribes he met in this vast area. He adds a systematic account of the still little-known languages of the region, and his text concludes with meteorological, botanical and linguistic tables.

Not over a fourth of the book, however, is occupied by the text; for this is followed by 114 full-page photographs, one of the best collection of pictures that have yet come from the Belgian Congo. They give many types of landscape, vegetation, the natives, and their various arts. The work will have a high place among books on the Congo.

Marine Investigations in South Africa, Vol. V. 198 pp. and 20 plates. South African Philosophical Society, Cape Town, 1908.

Describes the *Opisthobranchiata*, a new species of *Planocera*, new forms of the *Hemichordata*, a parasitic *Copepod*, and the genus *Botellina*. The plates, black and in other colors, illustrate these forms of life.

ASIA

Aux Ortos. Pays et mission. Par P. Albert Botty. 58 pp. and illustrations. Séminaire des Missions de Scheut-lez-Bruxelles, 1910. Fr. 1.

A description of a part of southwestern Mongolia and of its inhabitants. The little book is of value as giving much detailed and careful information

obtained by a missionary who has long resided there. The pictures help the text.

The Garos. By Major A. Playfair, I.A. With an introduction by Sir J. Bampfylde Fuller, (Published under the orders of the Government of Eastern Bengal and Assam.) xvi and 172 pp., 17 illustrations, 2 maps, and appendices. David Nutt, London, 1909.

Major Playfair describes the general characteristics, customs and language of the Garo tribe. They inhabit the end of the mountain promontory that runs out into the rice lands of Bengal; and they were the first mountaineers with whom the British rulers of Bengal came into contact. They are of Tibeto-Burman stock and their language still retains some similarity to Tibetan. Major Playfair is Deputy Commissioner of Eastern Bengal and Assam. The good book he has written is the result of his unusual opportunities for procuring accurate information, and of his scientific instinct and training, that make his writings careful and trustworthy. The book is a minute study of the people, with much attention to the folklore and a description of their language based upon the grammar by the Rev. E. G. Phillips, of the American Baptist Mission.

Sketches from the Karen Hills. By Alonzo Bunker, D.D. xvi and 199 pp., 17 illustrations. Fleming H. Revell Co., New York and Chicago, 1910. \$1.

Dr. Bunker, now in well-earned retirement, was for forty years a representative in Burma of the American Baptist Missionary Union. This new volume from the pen of the pioneer missionary will be welcomed, for Dr. Bunker is a good writer with a story to tell. It has been his lot to make long and perilous journeys to grossly ignorant tribes, whom he helped to change into peaceable, intelligent and law-abiding men and women. These sketches of what he saw and learned are simply written, and the book is both instructive and interesting.

The Mantle of the East. By Edmund Candler. 297 pp. and 17 illustrations. William Blackwood & Sons, Edinburgh and London, 1910. 6s.

The author has travelled in the Orient for over ten years. He has had an opportunity to acquire more than superficial knowledge of much that he has seen. These travel sketches contain a good deal that is above the level of such narratives, but the book was written chiefly for entertainment. This purpose has been successfully carried out.

Sur les Grandes Routes de l'Asie Mineure. Les Parours ferrés de la Péninsule; Lignes des Chemins de Fer "Ottoman d'Anatole et de Bagdad," Lignes "d'Aidin" et de "Cassaba." Par Jean de Nettancourt-Vaubecourt. iv, 49 pp., xl plates and maps. Ernest Leroux, Paris, 1908. F. 12.

A good geographical description of the important travel routes and railroad lines of Asia Minor, with a large series of photo-engravings of scenes along these routes, accompanied by brief descriptive text.

Geographische Charakterbilder aus der asiatischen Türkei und dem südlichen mesopotamisch-iranischen Randgebirge (Puscht-i küh). Eine Darstellung der Oberflächengestalt, Bevölkerung, Siedlung und Wirtschaft. 176 Originalaufnahmen und drei Karten. Von Hugo Grothe, Dr., jur. et phil. Karl W. Hiersemann, Leipzig, 1909.

Admirable photo-engravings, illustrating Dr. Grothe's journeys. Most of

the material is entirely new and the pictures in connection with the accompanying maps, give a clear idea of the regions he visited.

Carbon und Carbonfossilien des nordlichen und zentralen Tianschan. Aus den wissenschaftlichen Ergebnissen der Merzbacherschen Tianschan Expedition. Von Paul Grober. Mit drei Tafeln. Verlag der K. B. Akademie der Wissenschaften, München, 1909.

Forms part of the scientific results of Dr. Merzbacher's Expedition of 1902-03.

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NEW MAPS

NORTH AMERICA

UNITED STATES GEOLOGICAL SURVEY MAPS

TOPOGRAPHIC SURVEY SHEETS:

Alabama: Montevallo Quadrangle, 1:62,500. Contour interval 50 ft.

Arizona: Bisbee Quad., 1:62,500, interval 50 ft.; Ray Quad., 1:62,500, interval 50 ft.

California: Bruceville Quad., 1:31,680, interval 5 ft.; Galt Quad., 1:31,680, interval 5 ft.; Castle Quad., 1:31,680, interval 5 ft.; Headreach Quad., 1:31,680, interval 5 ft.; Isleton Quad., 1:31,680, interval 5 ft.; Jersey Quad., 1:31,680, interval 5 ft.; Knights Landing Quad., 1:31,680, interval 5 ft.; Lincoln Quad., 1:31,680, interval 5 ft.; Marcuse Quad., 1:31,680, interval 5 ft.; New Hope Quad., 1:31,680, interval 5 ft.; Nicolaus Quad., 1:31,680, interval 5 ft.; Pleasant Grove Quad., 1:31,680, interval 5 ft.; Rio Vista Quad., 1:31,680, interval 5 and 10 ft.; Roseville Quad., 1:31,680, interval 5 ft.; Vernon Quad., 1:31,680, interval 5 ft.; Woodbridge Quad., 1:31,680, interval 5 ft.; Sheridan Quad., 1:31,680, interval 5 ft.

California-Nevada: Furnace Creek Quad., 1:250,000, interval 100 ft.

Colorado: Boulder Quad., 1:62,500, interval 100 ft.; Breckenridge Special Map, 1:24,000, interval 50 ft.; Danforth Hills Quad., 1:125,000, interval 100 ft.; Eaton Quad., 1:125,000, interval 20 ft.; Grand Hogback Quad., 1:125,000, interval 100 ft.; Rangely Quad., 1:125,000, interval 100 ft.; White River Quad., 1:125,000, interval 100 ft.

Illinois: Carlyle Quad., 1:62,500, interval 20 ft.; Hardinville Quad., 1:62,500, interval 20 ft.; Murphysboro Quad., 1:62,500, interval 20 ft.; Okawville Quad., 1:62,500, interval 20 ft.

Indiana: Bloomington Quad., 1:62,500, interval 20 ft.

Kansas-Missouri: Leavenworth Quad., 1:62,500, interval 20 ft.

Kentucky: Princeton Quad., 1:62,500, interval 20 ft.

Louisiana: Mound Quad., 1:31,680, interval 5 ft.

Maryland-Virginia-West Virginia: Antietam Quad., 1:62,500, interval 20 ft.

Michigan: Fowlerville Quad., 1:62,500, interval 20 ft.

Mississippi: Dundee Quad., 1:31,680, interval 5 ft.; Coahoma Quad., 1:31,680, interval 5 ft.; Jonestown Quad., 1:31,680, interval 5 ft.; Walnut Lake Quad., 1:31,680, interval 5 ft.

Missouri: Macon Quad., 1:62,500, interval 20 ft.; Higdon Quad., 1:62,500, interval 20 ft.

New Jersey-New York: Greenwood Lake Quad., 1:62,500, interval 20 ft.

Nevada: Carson Sink Quad., 1:250,000, interval 100 ft.

New York: Bath Quad., 1:62,500, interval 20 ft.; Stony Creek Quad., 1:62,500, interval 20 ft.

New York-New Jersey: Ramapo Quad., 1:62,500, interval 20 ft.

Ohio: Conesville Quad., 1:62,500, interval 20 ft.; Frazeyburg Quad., 1:62,500, interval 20 ft.; Granville Quad., 1:62,500, 20 ft.; McConnellsville Quad., 1:62,500, interval 20 ft.; Philo Quad., 1:62,500 interval 20 ft.

Oklahoma: Pawhuska Quad., 1:125,000, interval 50 ft.

Oregon: Eugene Quad., 1:62,500, interval 5 and 10 ft.

Pennsylvania: Bedford Quad., 1:62,500, interval 20 ft.; New Kensington Quad., 1:62,500, interval 20 ft.; York Quad., 1:62,500, interval 20 ft.; Zelienople Quad., 1:62,500, interval 20 ft.

Tennessee: Pikeville Special Quad., 1:62,500, interval 20 ft.

Texas: Burnet Quad., 1:125,000, interval 25 ft.; Linden Quad., 1:62,500, interval 20 ft.

Washington: Zillah Quad., 1:125,000, interval 50 ft.

Wisconsin: Waterloo Quad., 1:62,500, interval 20 ft.

Wyoming: Rock Springs Quad., 1:62,500, interval 50 ft.

West Virginia: Clay Quad., 1:62,500, interval 50 ft.; Fayetteville Quad., 1:62,500, interval 50 ft.; Gassaway Quad., 1:62,500, interval 50 ft.; Montgomery Quad., 1:62,500, interval 50 ft.

Utah: Fish Springs Quad., 1:250,000, interval 100 ft.

Utah-Colorado: Jensen Quad., 1:125,000, interval 100 ft.

UNITED STATES. Black maps showing distribution of granite quarries and granite, as follows: Maryland, 1 inch = 16 miles; Virginia, 1 inch = 15 miles; North Carolina, 1 inch = 16 miles; South Carolina, 1 inch = 16 miles; Georgia, 1 inch = 17 miles. Illustrate *Bull.* 426: "Granites of the Southeastern Atlantic States," by Thomas L. Watson. Washington, 1910.

UNITED STATES. Distribution of Iron Ores of the Lake Superior District in 1909. 1:2,500,000 = 39.46 miles to an inch. 4 colors. Washington, 1910. [The symbols show the amount of ore in long tons taken from each of the Lake Superior ranges and the distribution of the ore to the various centers of smelting and manufacture. A similar map was published to illustrate the movement of these iron ores in 1902 and its usefulness suggested this revised map for 1909. The descriptive text is by Mr. Birkinbine.]

UNITED STATES. United States. 1:2,500,000 = 39.46 miles to an inch. Revised edition. 3 sheets. 3 colors. U. S. Geol. Surv., Washington, 1910. [This wall map was first published in 1890, the original compilation being under the direction of Mr. Henry Gannett. Its notable features are the clear presentation of the railroad systems, the naming and boundaries of all the counties and the sharp definition of practically all the hydrographic features, including many lakes of very small area. On many European maps of this scale, considerable detail of land forms would be shown without overcrowding, but on this map there is no indication of the relief of the land. Compilers of maps for school geographies, who seem to have difficulty in placing towns on the right side of rivers, may derive advantage from consulting this map. An inset shows Alaska, (1 inch = 170 miles) and gives a good idea of its hydrography and the position of towns, including a few new names.]

UNITED STATES. United States. Relief Map. 1 inch = 110 miles. Compiled by Henry Gannett. 8 tints for elevations and one for depths. U. S. Geol. Surv., Washington, 1910. [This excellent map showing the relief forms of the country, was first produced by Mr. Gannett, about 20 years ago and has been very useful, especially in schools and in the compilation of other maps showing the relief forms of the United States.]

U. S. COAST AND GEODETIC SURVEY CHARTS.

New or corrected editions of charts: *Connecticut.* North Shore of Long Island Sound, Fairfield to George's Rock. 1:10,000. *Georgia.* No. 155. From Hunting Island to Ossabaw Island including Port Royal Sound and Savannah River. 1:80,000. *Massachusetts.* No. 110. Cape Cod Bay. 1:80,000. *Maine.* No. 103. Mt. Desert Island. Frenchman's and Blue Hill Bays and Approaches. 1:80,000. *New York.* No. 271. North Shore of Long Island Sound. Rhineck to New Rochelle. 1:10,000. *New Jersey.* No. 565. Passaic River. Newark Bay to Belleville. 1:10,000. *North Carolina.* No. 146. Oracoche Inlet to Beaufort including Core Sound. 1:80,000. *Oregon and Washington.* No. 6,100. Pacific Coast. Cape Lookout to Gray's Harbor. 1:200,000. *Washington.* No. 6,400. Sea Coast and Interior Waters of Washington from Gray's Harbor to Semiamoo Bay. 1:300,000; Gray's Harbor No. 6,195, 1:40,000. *Rhode Island.* No. 352. Providence Harbor. 1:10,000. *Hawaiian Islands.* No. 4,005. Kahului Harbor and Approaches. Island of Maui. 1:10,000. *Philippine Islands.* No. 4,344. Mindoro, North Coast, Port Gallera and Varadero Bay. 1:10,000. *Philippine Islands.* No. 4,200. Mercator Projection. Compiled from United States and Foreign sources. Washington, D. C., October, 1910. [This fine chart shows many hundreds of soundings in fathoms, with numerous indications of the nature of the sea bottom, the direction of currents, the position of lighthouses, etc.]

U. S. HYDROGRAPHIC OFFICE CHARTS

Pilot Chart of the North Atlantic Ocean, Dec. 1910.

U. S. DEPT. OF AGRICULTURE MAPS

UNITED STATES. Soil Survey Maps of Franklin Co., Ga.; Sumner Co., Tenn., Spencer Area, W. Va.; Marianna Area, Fla.; Anne Arundel Co., Md.; Atchison Co., Mo.; Anderson Co., S. C.; Morris Co., Tex. 1:63,360 and 1:62,500. [In colors with contours of elevation and descriptive text.]

CALIFORNIA. Administrative map of Yosemite National Park. 1:125,000 = 1.9 miles to an inch. Topography by R. B. Marshall and A. H. Sylvester. 28 colored and black symbols. Edition of April, 1910. U. S. Geol. Surv., Washington, 1910. [The present edition of this fine map brings all information to date. It should be used as a basis in the production of atlas and tourist maps of this region.]

MARYLAND. A plan of the boundary lines between the Province of Maryland and the three lower counties of Delaware with part of the parallel of latitude, which is the boundary between the Provinces of Maryland and Pennsylvania. 1 inch = 6 miles. Black. In pocket. Illustrates "Report on the Resurvey of the Maryland-Pennsylvania Boundary, part of the Mason and Dixon line." Maryland Geol. Surv., Vol. 7, Baltimore, 1908. [A facsimile of the parchment map prepared by Mason and Dixon in 1768.]

MARYLAND. Map showing the limestones of Maryland. 1 inch = 3 miles. 12 tints for geological formations. Illustrates "Report on the Limestones of Maryland" by E. B. Mathews and John Grasty. Maryland Geol. Surv., Vol. 8, Baltimore, 1909.

MARYLAND. Map of Maryland showing Floristic Zones and Ecological districts. No scale. Black. Illustrates "The Plant Life of Maryland," by F. Shreve and others. Maryland Weather Serv., Vol. 2, Baltimore, 1910.

MARYLAND. Maps of Maryland. (a) Showing the relative valuation of farm buildings; (b) the relative production of corn; (c) the relative production of wheat; (d) the relative production of tobacco; (e) the acreage in canning crops; (f) the relative production of hay; (g) the relative production of milk. Black. Small maps illustrating "The Relation of Natural Vegetation to Crop Possibilities" by F. Shreve. Maryland Weather Serv., Vol. 3, Baltimore, 1910.

SOUTH DAKOTA. Map of the Black Hills region. 1 inch = 22 miles. Arranged by C. C. O'Harra. Black. Illustrates the "Badland Formations of the Black Hills region" by the same author. South Dakota School of Mines, Dept. of Geol., *Bull.* No. 9, Rapid City, S. D., 1910. [Four symbols show geological formations. Based chiefly on Darton's survey (1905) as modified by Matthew and Thomson (1906-07).]

UNITED STATES. Die Wasserstrassen im östlichen Teile der Vereinigten Staaten von Amerika. 1:7,500,000 = 118.37 miles to an inch. Four colors. With paper "Binnenschiffahrtswege in den Vereinigten Staaten von Amerika". By Hans Fehlinger. *Deut. Rund. f. Geog.*, Vol. 33, No. 1. Vienna, 1910. [Shows in colors the navigable rivers, canals and canalized rivers of the U. S. as far west as Central Texas and Eastern North Dakota.]

CANADA. Map of Bow River Valley between Bow Peak and Castle Mountain Station. 1 inch = 2½ miles. Contour interval 1,000 feet. Black. Illustrates "Pre-Cambrian Rocks of the Bow River Valley, Alberta, Canada". By Charles D. Walcott. *Smiths. Misc. Coll.*, Vol. 53, No. 7, Washington, 1910.

CANADA. Ontario. (Gowganda sheet). 1:250,000 = 3.95 miles to an inch. Standard Topographical map, sheet 8, N. E. (part). 4 colors. R. E. Young, Chief Geographer. Dept. Interior, Ottawa, 1910.

CANADA. Map of Western Canada. 4 sheets. 1:2,217,000 = 35 miles to an inch. 6 colors. R. E. Young, Chief Geographer, Dept. Interior, Ottawa, 1910. [A superior map, sharply differentiating between the surveyed and unsurveyed parts of rivers, giving names of all new townships in the western provinces

now being settled, railroad lines in operation or construction and a clear idea of drainage basins. No attempt is made to show surface forms.]

CANADA. Prince Edward Island, Nova Scotia and New Brunswick. Standard Topographical Map. 1:250,000 = 3.95 miles to an inch. 6 colors. R. E. Young, Chief Geographer. Dept. Interior, Ottawa, 1910.

SOUTH AMERICA

CHILE. Trabajos jeodésicos Chilenos. 1:7,000,000 = 110 miles to an inch. 2 colors. With "Reseña Jeneral sobre el Estado actual de la Cartografía Americana." By Luis Riso Patron. Santiago de Chile, 1909. [Shows the trigonometrical network as extended in Chile at the time of publication. The paper with the map, is an excellent summary of the progress and position of cartography in the countries of America, in 1908.]

PERU. Mapa que comprende las ultimas Exploraciones y Estudios verificados. Desde 1900, Hasta 1906. 1:1,000,000 = 15.78 miles to an inch. 4 colors. *Bol. de la Soc. Geog. de Lima*, año xix, Tomo xxv. Trimestre Primero. Lima, 1909.

SOUTH AMERICA. Eduard Graf v. Wickenburgs Reisen in Südamerika 1907-10. 1:25,000,000 = 394.5 miles to an inch. 3 colors. *Pet. Mitt.* 56 Jahrg., 11 Halbband, 5 Heft, 1910. [Illustrates Count von Wickenburg's summary of his route through southern and western South America, from Cape Horn to the Amazon.]

AFRICA

ALGERIAN SAHARA. Croquis Schematic des régions de l'Ouest du cercle de Colomb. Dressé par le Service des Renseignements et mis à jour par le lieutenant Bernard. 1:800,000 = 12.6 miles to an inch. Black. Illustrates "Les routes vers la Moulouya". *Bull. Trim. de la Soc. de Géog. et d'Arch. d'Oran*. 33e année, Tome xxx, Fasc. cxxii (1er Trim.). Oran, 1910.

BRITISH WEST AFRICA. Sketch map of Gold Coast and Ashanti. 1 inch = 65 miles. Black. Illustrates "The Topography climate and vegetation of the Gold Coast". *Scott. Geog. Mag.*, Vol. xxvi. No. 9, 1910. [Shows the distribution of the various types of forests within the limits of the Gold Coast and Ashanti.]

CENTRAL SUDAN. La Frontière Quadai-Darfour. 1 inch = 8.7 miles. Black. With paper, same title, in *l'Afrique Française*, dix-neuvième Année, p. 253, 1910. [Based on the map of the Anglo-Egyptian Sudan, Intell. Off., Khartum, Ed. of 1909.]

CONGO, Belgian. Les voies d'accès le Katanga. 1 inch = 270 miles. Black. With "Les Chemins de Fer nationaux vers le Katanga". *Le Mouve. Géog.* No. 43, Brussels, 1910. [Gives the latest information as to the railroads in operation, construction, or projected to or towards the great mining region of Katanga, in the S. E. part of the Belgian Congo.]

EAST TROPICAL AFRICA. Karte der Eisenbahnen in Ost-Afrika. No scale. 3 colors. With paper "Die Eisenbahnen Ostafrikas." By E. Amonn. *Deut. Rund. f. Geog.* Vol. 33, No. 2, Vienna, 1910. [Shows in colors the railroads in operation, building or projected in British East Africa, German East Africa and Uganda.]

EGYPT. Egypt. 1:50,000 = 0.7 mile to an inch. Sheets V-IV, V-V, V-VI, V-VII, VI-VI N. W. Survey Dept., Egypt, Cairo, 1910. 50 mills, a sheet.

NORTH AFRICA-WEST ASIA. Der Orient. 1:20,000,000 = 315.6 miles to an inch. 3 colors. By Ewald Banse. With paper, "Abflusslosigkeit und Entwässerung im Orient," same author. *Globus*, xcvi, p. 117, 1910. [A good map showing the waterless areas and areas of interior drainage in the Sahara, Sudan, Arabia, Iran and Asia Minor.]

NORTHERN NIGERIA. Part of Nassarawa Province. 1:500,000 = 7.89 miles to an inch. By D. Cator. Black. *Geogr. Journ.*, London, Dec., 1910. [A short description of the map, by Mr. Cator, is given.]

SAHARA. Itinéraire du Capitaine Cortier dans l'Adrar. 1:1,500,000 = 23.67 miles to an inch. Black. Illustrates "Itinéraire du Capitaine Cortier, de Teleya à Tombouctou". *La Géog.*, Vol. xxi, No. 6, Année, Paris, 1910.

SOUTH AFRICA. South Africa showing railways. 1:10,000,000 = 157.8 miles to an inch. 2 Colors. Illustrates "Railway Projects in South Africa". *Geogr. Journ.*, London Dec., 1910. [Shows a number of projected lines in West Africa which if completed, as proposed, to railroad lines in the East, will make several Transcontinental railroads between the Indian Ocean and the Atlantic.]

SOUTHERN NIGERIA. The Oban District. From a survey by P. A. Talbot, 1909. 1:200,000 = 3.15 miles to an inch. Four colors. Inset diagram of main triangulation on which the map is based. Illustrates the "Land of the Ekoï, Southern Nigeria" by same author. *Geogr. Journ.*, London, Dec., 1910. [On the margin are lists of positions. The area mapped, is in the southeastern part of the province between Cross River and Cameroons.]

ASIA

JAPAN. Geologic sketch of the Holgol district. 1:50,000 = 0.79 mile to an inch. 5 colors. *Journ. of the Coll. of Sci., Imperial Univ. of Tokio*, 1910.

PALESTINE. Plan of Jaffa. 1 inch = 560 feet. Black. With paper, "Jaffa," Dr. L. Saad. *Globus*, Vol. xcvi, p. 138, 1910.

SIBERIA. Fundorte von Mammut und Nashorn—Resten in Siberien. 1:20,000,000 = 315.6 miles to an inch. 4 colors. *Pet. Mitt.*, 11 Halbband, 5 Heft, Taf. 44. [Based on map of the Imperial Russian Academy of Sciences, 1909. Shows all the locations where mammoths and rhinoceroses have been found in Siberia, with the dates of the finds from the middle of the 17th century to the present time.]

EUROPE.

THE ALPS. Hölzel's Wandkarte der Alpen auf Grundlage der V. von Haardtschen Karte. Vollständig neu bearbeitet von Dr. Franz Heiderich. 1:600,000 = 9.4 miles to an inch. 13 colors and tints. Verlag von Ed. Hölzel in Wien, 1909. In sheets, M. 31. [This map takes its place in the fore front of the best detailed world maps of the whole Alpine regions. Its topography is based upon Government surveys. The contours of elevation (from 200 to 3,000 meters), reinforced by light and shade, give clear expression to relief features. All details are sharply defined and the map is easy to read. For library and school purposes this product will be very useful in all countries. At the bottom are several profiles through various parts of the Alps].

AUSTRIA-HUNGARY. G. Freytag's Automobil- und Radfahrer-Karten. (a) Blatt 20, Brünn; (b) Blatt 29. Südtirol und Oberitalien. 1:300,000 = 4.73 miles to an inch. In colors. [Examples of a good series of automobile route maps.]

BULGARIA. Situationsplan der Eisenbahnstrecke Radomir-Küstendil in Bulgarien. 1:200,000 = 3.15 miles to an inch. 3 colors. With paper, "Durch das Strumadefilee nach der bulgarischen Thermenstadt Küstendil," by F. Meinhard. *Deutsche Runds. f. Geogr. u. Stat.*, xxxii Jahrg., p. 528, Vienna, 1910.

CENTRAL EUROPE. G. Freytags Automobil-Routenkarte von Mittel-Europa. 1:2,000,000 = 31.56 miles to an inch. Inset Umgebung von Wien, 3 colors. G. Freytag & Berndt, Wien, 1910. M. 2.50. [A good road map with red figures showing distances between places in kilometers.]

FRANCE. Étude du Profile en Long des Cours d'Eau français. État d'avancement en 1910. 1:2,200,000 = 34.7 miles to an inch. 3 colors. With paper, same title, by Emm. de Margerie. *Ann. de Géog.* No. 106, xix^e Année, 1910. [Shows the present state of the mapping of profiles of the French rivers.]

GERMANY. Thüringerwald-Karten. Blatt 1: Eisenach-West; 5: Friedrichroda-Waltershausen; 14: Ilmenau. 1:50,000 = 0.79 mile to an inch. Colors. Descriptive text. 80 pfg. each. H. Kahle, Eisenach, 1910. [Examples of this excellent series (34 maps) of small districts].

NORWAY (a) Topografisk kart over kongeriget Norge. 1:100,000 = 1.5 mile to an inch. Sheets: L 13, Saltdalen; 19 D, Gran; V 7, Baeivasgiedde. (b) Generalkart over det sydlige Norge i 18 Blade. xviii. 1:400,000 = 6.33 miles to an inch. Udgivet af Norges geografiske Onmaaling Kristiania, 1910.

SWEDEN. Seismiche Karte von Schweden, entworfen im Jahre 1910. Von Prof. Dr. R. Kjellén. 1 inch = 50 miles. 5 tints and black. *Geogr. Zeitsch.* Vol. 16, No. 11, Leipzig, 1910.

UNITED KINGDOM. (a) Map showing Positions of Climatological Stations. 1 inch = 80 miles. Black. [Distribution of observing stations and their height above sea level;] (b) Map showing the positions of stations having self-recording instruments. 1 inch = 80 miles. Black; (c) map showing positions of meteorological stations whose reports are used in the preparation of the London daily weather reports. No scale. [These stations extend from Moscow to Iceland and Horta. Stations which report to London by telegraph are distinguished from others.] Illustrates Fifth Annual Report of the Meteorological Committee, for the year ended March 31, 1910, London, 1910.]

POLAR

DANISH WEST GREENLAND. (a) Nördliches Westgrönland; (b) Südliches Westgrönland. 1:5,000,000 = 78.9 miles to an inch. Black. By M. C. Engell. With paper, "Bemerkungen über die geographische Lage der Niederlassungen in Westgrönland, same author. *Mitt. der k. k. Geogr. Ges. in Wien*, Band 53, Taf. ix und x, Vienna, 1910.

WORLD. Weltkarte der Erzlagerstätten. 1:45,000,000 = 710.22 miles to an inch. Entworfen von Diplomingenieur J. W. H. Adam. 11 colors for minerals. Insets of Middle Europe, 1:7,500,000, Central Germany, 1:2,500,000, and Southern Norway and S. Sweden, G. Freytag & Berndt, Wien, no date. Linen, M. 2.50. [Shows distribution of ore deposits. The data given are so deficient for many parts of the world, as Alaska, Katanga, German Southwest Africa, The Philippines and some other lands, as to give the impression that the map is not of recent compilation].

SCHOOL WALL MAPS AND ATLASES

SCHOOL WALL MAPS. (a) NORTH AMERICA. Physical features. 1:7,500,000 = 118.37 miles to an inch. 16 colored symbols for heights and depths. Clarendon Press, Oxford and New York, 1910. [An example of "the Oxford Wall Maps" edited by A. J. Herbertson, M.A., professor of Geography, Univ. of Oxford. The series embraces sets of maps showing (1) physical features without names, (2) physical features with physical names, (3) physical features with political names, (4) rainfall, (5) vegetation. These maps, 33 in all, are each 60 x 40 inches in size, and 20 of them are now on the market. This map of North America shows physical features, with names the most important of which are printed in large type which all the class may read. The chief mountains and rivers stand out clearly, many heights and contours of elevation are shown, and the contours of ocean depths and the limits of the coastal plain are brought out with much clearness;] (b) AFRICA. Vegetation. 1:7,500,000 = 118.37 miles to an inch. Compiled by Dr. M. Hardy. 16 colored symbols and white. Clarendon Press, Oxford and New York, 1909. [Another of the Oxford Wall Maps. It is on the Sanson-Flamsteed projection, equal area, a square inch on the map representing 14,000 sq. miles in nature. It illustrates, in bold colors, the distribution of the leading types of vegetation, the Desert is differentiated from the wide zone of semi-desert, bordering the Sahara on the north, in which, the fibre alfa is an export product. Forests are strongly contrasted with the savannas. The distribution of the tropical and temperate forests, the zone where the olive thrives, all the oases, the steppes adapted for stock raising, etc., are clearly defined. The map is adapted for large class-rooms.]

ATLAS. Prof. A. L. Hickman's Geographisch-statistischer Taschen-Atlas von Österreich-Ungarn. 3. vollständig neu bearbeitete Auflage. 60 Diagrammen. Karten und Bilder. G. Freytag & Berndt, Wien, 1909. Kr. 5. [The latest issue of this well-known atlas of Austria-Hungary fitted for the pocket and containing many good maps and 91 pp. of statistical and descriptive text.]

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CHARCOT'S ANTARCTIC EXPLORATIONS*

BY

EDWIN SWIFT BALCH

Dr. Jean B. Charcot, in the years 1903-1904-1905, and 1908-1909-1910, organized and led to West Antarctica two French expeditions which obtained many important geographic and scientific results. The accounts which he has published of these two expeditions are delightfully written, profusely illustrated, and are probably the most distinctly literary works extant about the South Polar regions.

Charcot's first expedition was financed with the greatest difficulty. Only \$90,000 were raised, with which Charcot not only had to equip his expedition, but build a ship. The result was that not only was the *Français*, built at Saint Malo, very small, but her engines were much too weak. The scientific staff consisted of naval lieutenant A. Matha, naval ensign J. Rey, Dr. J. Turquet, Mons. E. Gourdon and Mons. P. Pléneau. They set sail from France at the end of August, 1903; from Buenos Aires, Dec. 23, and from Orange Bay, Jan. 27, 1904.

On Feb. 1, 1904, the expedition sighted Smith's Island, then it sailed past Low and Hoseason Islands, and coasted along the west shores of Liège, Brabant and Anvers Islands, arriving at the southern entrance of Gerlache Strait on Feb. 6. There were many tabu-

* *Le Français au Pôle Sud*. Journal de l'expédition Antarctique Française, 1903-1905. Paris, Ernest Flammarion, (1906).

Le Pourquoi Pas ? dans l'Antarctique. Journal de la deuxième expédition au Pôle Sud, 1908-1910. Paris, Ernest Flammarion (1910).

The map reproduced with this article is drawn in degrees of longitude west of Paris. This map and the pictures here used are taken from Dr. Charcot's book, *Le Pourquoi Pas ?*

lar icebergs there. The next day they tied up in Flanders Bay for ten days, to fix up the bad engines. On Feb. 19, they sailed to Wiencke Island, where they found good anchorage in a small bay they named Port Lockroy. On Feb. 21, they arrived at Wandel Island, which they renamed temporarily Booth Island, where they found another good harbor. On Feb. 25, they sailed southwest, forcing their way through dense pack. On Feb. 26 and 27, they were off the Biscoe Islands in about 66° S. lat., where they could see the coast of Graham Land extending southward without any apparent break. The pack was so thick, however, and the southern winter so near that Charcot decided to return north to the harbor on Wandel Island. They reached this bay on March 4, and called it Port Charcot, after the explorer's distinguished father.

In Port Charcot, $65^{\circ} 5'$ S. lat., the *Français* stayed until Dec. 25, 1904. She was anchored in a small bight in the harbor, and some yards and topmasts were fixed with a chain to seaward to prevent pack ice from jamming in on her. This novel artificial barrier worked well. The Antarctic winter was spent mainly in scientific observations of many kinds. A small hut was set up on the shore and many of the provisions were stored in it; and another small cabin was erected in which magnetic and meteorologic observations were carried out all winter. There was practically no suffering from the cold, the temperatures being much higher than might have been expected. The lowest were in July, 1904, the mean for the month being only $-19^{\circ} 20'$ Cent.,* with a minimum of -39° Cent.† Of course, there were many high winds, snow storms and heavy fogs, but the weather conditions were evidently less severe than those that Dr. Nordenskjöld experienced at Snow Hill. Lieutenant Matha had an attack of sickness during July similar to that of several other men who have wintered in the Antarctic. Charcot thinks this malady is possibly due to some "probable modification of the constitution of the atmosphere of these regions in winter."‡ Matha recovered in due time by sitting a certain number of hours a day undressed in front of a red hot stove, and by a liberal diet of condensed milk. As in other recent Antarctic expeditions, furs were worn but little; woolen clothing, with canvas coats and overalls to cut the wind and snow, proving sufficient protection. The French *déjeuner* and *dîner*, with soup, meat, vegetable and dessert each time, also proved most suitable in the Antarctic, and there never seems to have been any complaint, but, on the contrary, much praise, about

* *Le Français*, etc., p. 351.

† *Le Français*, etc., p. 168.

‡ *Le Français*, etc., p. 181.

the food. The meat of seals and penguins formed the main staple of the table, and both were found good eating: this was doubtless due to their being in the hands of a good cook. Several kinds of rather small fish also furnished valuable fresh food. Seals and penguins were never killed for sport, and no writer, perhaps, has studied so carefully nor written so entertainingly of the habits of the penguin as Charcot.

Many short excursions were made during the winter in the neighborhood of Port Charcot on Wandel and Hovgaard Islands. Between Nov. 24 and Dec. 5, Charcot made a "raid" to the south. The party



FIG. 2—Pushing into the floe ice off Alexander I. Land.

took a boat, and partly by rowing, partly by dragging the boat over the ice, with great pluck and fatigue, reached a small island in about $65^{\circ} 30'$ S. lat. They climbed to the summit, about 200 meters high, and, the day being perfectly clear, were able to see the coast of Graham Land as far as the Biscoe Islands in 66° S. lat.

During the month of December the ice gradually broke up round the *Francais*, and on Christmas day they were able to sail away from Port Charcot, reaching next day Port Lockroy on Wiencke Island, where they stayed till Jan. 4, 1905. Triangulations by Lieutenant

Matha showed the central peak on Anvers Island, which was christened "Mont du Français," to be 2,869 meters high. Thence they sailed up Gerlache Strait, then west up Schollaert Strait into Dallman Bay, and after some fairly careful map work, on Jan. 7, they sailed south. After a terrific storm they sighted land on Jan. 11, and closed in with it on Jan. 15. It was seen extending between about $66^{\circ} 40'$ S. lat. and $67^{\circ} 10'$ S. lat., and at the time was supposed to be part of the west coast of northern West Antarctica. It was christened "Loubet Land," but Charcot has since discovered that it was Adelaide Island. Unfortunately, just at the crucial moment, when new discoveries were imminent, the *Français* ran plumb on to a sunken rock. The explorers had been lulled into belief in the presence of deep water ahead, as within "one cable's length" of the reef was an iceberg fifty meters high. The *Français* stove in her bows so badly that immediate return was imperative. By dint of pumping steadily the ship was kept afloat, and, after the greatest hardships, faced with splendid pluck and endurance, the expedition was just able to reach Port Lockroy on Wiencke Island on Jan. 29.

On Wiencke Island, the Alpine guide Pierre Dayné and the seaman Jabet climbed the peak of the island, 1,500 meters high, which Charcot named after the Duke of the Abruzzi. After temporary repairs to the ship, they started on Feb. 12, and sailed up Gerlache Strait, visited in boats the north shores of Brabant Island, and then passing Hoseason, Low and Smith Islands, sailed through Lemaire Strait, and reached Puerto Madryn in Argentine on March 4, 1905.

Dr. Charcot's second expedition, on account of the success of the first expedition, was financed more readily and largely. A bigger and stronger vessel, the *Pourquoi Pas?* was built also at San Malo. Dr. Charcot's scientific staff this time consisted of naval ensign M. Bongrain, astronomy and hydrography; J. Rouch, naval ensign, meteorology; R. Godfroy, naval ensign, tides; Dr. E. Gourdon, geology and glaciology; Dr. J. Liouville, zoology; L. Gain, zoology; and A. Senouque, magnetism.

The *Pourquoi Pas?* left Havre on Aug. 15, 1908. After several stops, at Madeira, Rio Janeiro, Buenos Aires, etc., she sailed from Punta Arenas on Dec. 16, 1908. On Dec. 22, they reached Deception Island, a name Charcot thinks most inappropriate, which seems to be changing considerably and where Yankee Harbor is silting up. They found there several Norwegian steam whalers, among them the *Raun* and *Gobernador Bories*. On the latter was Mrs. Andresen, the wife of her commander Captain Andresen, and Mrs. Andresen is the first woman on record who has crossed the sixtieth parallel of

south latitude. A number of whalers now go to the Antarctic every year, and they will pretty soon thin out the southern whales, as was done formerly to the northern whales. The British government makes these whalers pay them an annual tribute;* although, as England has never perfected by occupation any of her rights of discovery in the Antarctic, she has, according to international law, no legal sovereignty there†.

The *Pourquoi Pas?* started on Christmas day down Gerlache Strait, arriving on Dec. 29 at Wandel Island, where Charcot found numerous relics of his former wintering.

On Jan. 4, 1909, Charcot, Gourdon and Godfroy started for a day's boat excursion near Cape Tuxen. Caught in fog and bad ice, they were gone several days and in great danger. Almost imme-



FIG. 3—Alexander I. Land.

diately on their return the *Pourquoi Pas?* ran on to a rock near Cape Tuxen and was only got afloat with the greatest difficulty.

On Jan. 12, they continued south. On Jan. 13, they sailed between Rabot Island and Nansen Island of the Biscoe Archipelago. Here, in about $66^{\circ} 15'$ S. lat., they sighted a great bay which stretches far away into the mainland. This bay Charcot christened Pendleton Bay, as it about corresponds with the position of the bay J. N. Reynolds reported as discovered before the year 1828 by Benjamin Pendleton of Stonington, Conn. Charcot also asserts that the remarks about wind and weather in Reynolds' article prove that Pendleton had been in this region.

On Jan. 14, the *Pourquoi Pas?* arrived at the north end of Ade-

* Le "*Pourquoi Pas?*" etc., p. 41.

† Thomas Willing Balch: "The Arctic and Antarctic Regions and the Law of Nations": *The American Journal of International Law*, April, 1910.

laide Island. The discoveries of the next few days showed that it is much larger than was supposed. The northerly entrance to the later discovered channel between Adelaide Island and the mainland was called Matha Bay. Sailing southward to the west of Adelaide Island on Jan. 15 the *Pourquoi Pas?* entered the southern end of the same channel, and this was christened Marguerite Bay. The name Loubet Land, which Charcot had erroneously applied on his first voyage to part of Adelaide Island, was afterwards transferred to the mainland within the same parallels. In Marguerite Bay a small island was discovered and called Jenny Island. From its topmost point no sight of Alexander Land was obtained at this time, but to the southeast the mainland of West Antarctica was seen stretching away indefinitely south. This hitherto unsighted portion of the coast was then called Fallières Land.

Sailing south again, on Jan. 16, the *Pourquoi Pas?* was off the north shore of Alexander Land. From this point Fallières Land could be seen stretching south beyond the 69th parallel. Alexander Land was seen here for the first time from the north, and it is almost certain now that it is an island. Good photographs were obtained of Alexander Land, a rocky mountainous land, of which Dr. Charcot found that Bellingshausen's and Arctowski's descriptions were most accurate.

They were unable to break through the pack towards Fallières Land, or towards the southwest, and therefore the *Pourquoi Pas?* sailed back to Marguerite Bay. Thence they turned south again and on Jan. 22 were once more off the northern extremity of Alexander Land. But no further southing was possible, and so on Jan 23, they returned to Marguerite Bay.

Here they stayed several days, and Bongrain, Gain and Boland made an excursion to the north which, in connection with some observations taken in Matha Bay, proved the existence of a strait between Adelaide Island and Loubet Land. This channel seems to be still unnamed and it might fittingly be christened Charcot Strait. A curious incident happened in Marguerite Bay. One day a penguin popped up on the pack, holding on to a big fish. Bongrain grabbed the fish, which turned out to be a new variety; but the poor penguin, expressing its feelings forcibly, followed Bongrain to the ship. Charcot would have liked to winter in Marguerite Bay, but no safe anchorage could be found. Therefore, on Jan. 30, the prow of the *Pourquoi Pas?* was once more turned northward. Matha Bay was revisited, the Biscoe Islands were coasted along, and the ship brought to rest in Port Circoncision, Petermann Island.

Preparations for wintering were begun immediately. The ship was carefully secured within the harbor, and a chain stretched in front of her to ward off danger from any icebergs. Everything was prepared as far as possible for comfort and scientific work. Cabins for meteorology, seismology, etc., were erected on the island and observations were kept up all through the winter.

The weather was cold, but never extremely so. The mean temperature for the year 1909 was -2.785° C. The month of July was the coldest; with a mean temperature of -6.79° C. The lowest recorded temperature was in July and was only -23.9° C. (-11.02° F.). On March 24, there was heavy rain, and umbrellas would have been invaluable to walkers. There were storms, of course; but the weather is evidently much less severe on the western than on the eastern shore of northern West Antarctica.

There was some sickness during the winter. It was undoubtedly a form of scurvy, which did not attack the gums, but mainly the legs, and which also developed weakness of the heart. It was due to certain kinds of canned foods, and was conquered by a diet of seal and penguin meat.

Fortunately, there were many penguins at Petermann Island. On the arrival there of the *Pourquoi Pas?* Gain captured a number of them and put rings of diverse colors on their legs, and on the return of the penguins after the cold weather, many of them still had these rings on, showing that these birds not only return regularly to the same rookeries, but to the same spots in the rookeries.

Between Sept. 18 and Oct. 2, 1909, one raid was carried out on the mainland by Gourdon, Gain and Senouque. The weather, however, was so stormy that not much was accomplished, the party advancing only about 25 kilometers from the ship. Here, at a height of about 1,100 meters, they found themselves in a great circular valley, surrounded with a rampart of mountains, over which they were unable to make their way. It is evident, however, that, owing to the mountainous nature of West Antarctica, any attempts to penetrate it on foot and with sledges south of Charcot Land and Fallières Land will be fraught with the greatest difficulties.

On Nov. 25, 1909, the *Pourquoi Pas?* left Petermann Island. Sailing north through Gerlache Strait, they reached Deception Island on Nov. 27, and found several Chilean and Norwegian ships there, among them the *Gobernador Bories*, with Captain and Mrs. Andresen aboard, from which Charcot was enabled to replenish his coal supply.

The *Pourquoi Pas?* was found to be badly injured forward, prob-

ably as the result of her grounding off Cape Tuxen. Temporary repairs, however, were effected at Deception Island with the assistance of the Norwegian whalers, and between Dec. 23 and Dec. 31 a short cruise was made to the eastward. Heavy pack prevented any approach to Palmer Land, but they landed, probably the first time on record, on Bridgman Island, and they were able also to corroborate Dumont D'Urville and Nordenskjöld as to the non-existence of Middle Island.

On Jan. 6, 1910, the *Pourquoi Pas?* left once more Deception Island. Keeping well out at sea, she sailed southwest and south down the west coast of northern West Antarctica. On Jan. 10, somewhere about 69° S. lat., bottom was struck at 455 meters. On Jan. 11, 1910, the *Pourquoi Pas?* charged through the pack between about 75° to 76° long. W. of Greenwich, to well beyond 69° S. lat. and at that point, from the crow's nest, Charcot himself was the first to sight a new coast. Two or three mountain summits rose from an ice cap extending far to the east and west along about the 70th parallel. This land is apparently entirely separate from Alexander Land, but Charcot is convinced he could distinguish, although he was not absolutely sure, several more mountain summits in the direction of Fallières Land. This new coast may therefore turn out to be part of the mainland of West Antarctica or another big island like Brabant or Adelaide Island. Heavy pack prevented any near approach to it or any advance towards Fallières Land. On the return of the expedition, apparently mainly at the suggestion of the writer of this review, this new land was called Charcot Land.

The *Pourquoi Pas?* now cruised westward, following in the main the 70th parallel. She kept as far south as the pack would permit. Up to 102° W. long. the track was in general from one to two degrees north of the track of de Gerlache and from one to two degrees south of that of Bellingshausen. Two soundings, the one of 3,030 meters in S. lat. $69^{\circ} 10'$, W. long. 86.25° , the other of 4,350 meters in 69.20° S. lat., 99.49° W. long., show that this part of the cruise was outside of the continental shelf, over which de Gerlache undoubtedly drifted for some distance.

The *Pourquoi Pas?* passed close to the north of Peter I. Island, and Charcot was struck with the accuracy of Bellingshausen's description. A sounding of 1,400 meters, no bottom, within 6 miles, taken in connection with de Gerlache's sounding of 1,148 meters one degree and a half to the south, shows that Peter I. Island literally springs up right out of the ocean.

The cruise was continued always in about the same latitude. A

sounding in $69^{\circ} 15' \text{ S. lat.}$, $105^{\circ} 45' \text{ W. long.}$ gave 4,050 meters. Immediately after this the *Pourquoi Pas?* crossed the track of Capt. James Cook at the place where Cook made a dash due south, reached on Jan. 30, 1774, $71^{\circ} 10' \text{ S. lat.}$, $106^{\circ} 54' \text{ W. long.}$, and then returned straight north again. Charcot thought he might himself have gone a little further south than Cook did at this spot, and that there is a sort of permanent bay or indentation in the ice. The great number of icebergs also led him to think that land is not far distant.

Beyond this, the cruise, still following in the main the 70th parallel to about the 122d meridian, was in a wholly unknown region. On Jan. 21, 1910, in $70^{\circ} 5' \text{ S. lat.}$, $118^{\circ} 50' \text{ W. long.}$, a sounding of 1,040 meters was made. This is one of the most important of Charcot's discoveries. For it proves almost to a certainty that there is land about half way between Charcot Land and King Edward Land. It may be only one or more islands, but the indications are that it is the coast of West Antarctica, which, curving from Charcot Land to the southwest to perhaps $75^{\circ} \text{ S. lat.}$, between about 80° and $110^{\circ} \text{ W. long.}$, advances again to about $70^{\circ} \text{ S. lat.}$ in about $120^{\circ} \text{ W. long.}$

During this entire cruise, the *Pourquoi Pas?* kept as close to the pack as possible. Thick fogs, storms, and thousands of icebergs made the navigation exceedingly dangerous. Charcot thought that the pack and the icebergs between Peter I. Island and his most westerly point presented the same characteristics as those off Alexander Land and Charcot Land, and he is led therefrom to believe that land lies not far to the south, and that with clear weather they might have seen it in places. On Jan. 22, 1910, in about $70^{\circ} \text{ S. lat.}$ and $122^{\circ} \text{ W. long.}$, the *Pourquoi Pas?* was blocked by pack ice extending northward from proceeding further west, and as some of the crew were sick and the coal was running short, Charcot turned homewards and entered the Straits of Magellan on Feb. 1, 1910.

Charcot's expeditions are in the very forefront of leading Antarctic explorations. No one has surpassed him and few have equalled him as a leader or a scientific observer. He is absolutely impartial and accurate. When he started, little was known of the western coast of northern West Antarctica except the Gerlache Strait region and a couple of rather vague landfalls further south. Now this coast is practically surveyed from Liège Island in $64^{\circ} \text{ S. lat.}$ to Charcot Land in $70^{\circ} \text{ S. lat.}$ One of Charcot's most important discoveries is that of safe harbors at Wandel Island and Petermann Island, as these are available for bases and rallying points for future expeditions.

The geology and general appearance of this land are now fairly

well known. Everywhere there are mountains and rocky heights and except at a few favored spots, the shore consists of a wall of ice from 30 to 50 meters in height, from which the tabular bergs calve off. The inland ice or ice cap which rises from the shores of King Oscar Land and Foyn Land is invisible from the west coast, where only mountains and other mountains behind, with glaciers streaming down between, are in sight. The west coast is evidently not unlike the ocean coast of Norway, with its abrupt high cliffs and sharp peaks, a comparison already published in 1622, which proves that one traveller at least, probably Don Gabriel de Castiglio in 1603, had been in West Antarctica before that time.

That the mainland of West Antarctica also extends up to the Great Ice Barrier and includes King Edward Land is now withdrawn from the realm of surmise towards something like certainty, thanks to de Gerlache's and Charcot's soundings. This cannot be laid down positively as yet, but the indications certainly point that way. Whether or how West Antarctica connects with the great mountain range of East Antarctica, which Shackleton saw vanishing into the unknown, however, is still one of the geographical problems of the future.

Many new scientific facts were garnered by the various members of the staff, but are not worked out as yet. Among these may be specially mentioned some of the tidal observations of Godfroy, which agree perfectly with the theory of the tides of Lord Kelvin; the collecting by Gain of much plankton, of numerous cryptogams, algæ, phanerogams, and of some cultures of green snow; and the preparation by Liouville of many zoological and anatomical specimens which, especially in the line of embryology, have never before been seen by any naturalist.

Whether Charcot and France will take any further part in the exploration of Antarctica remains to be seen. Let us hope so! The *Pourquoi Pas?* is available and the unknown still looms large on the map. But whatever the future, knowledge and science have been widened by the splendid efforts of the Frenchmen who, with Charcot at their head, have explored the Antarctic.

THE KARST COUNTRY OF SOUTHERN ASIA MINOR

BY

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The castle where Midas hoarded the precious gold that he finally loathed; Lystra, where Saint Paul was worshipped, stoned, and left for dead; and the gushing spring beside which jealous Appollo flayed Marsyas; these and a dozen other storied sites lie within a circle 75 miles in radius, in the middle of southern Asia Minor. The center of the circle lies near Egerdir at the southern end of the beautiful lake of the same name. On the north the periphery touches the forested home of Midas in Phrygia; while on the west it intersects the dry shores of the salt lake of Buldur beyond the Marsyan spring. Eastward it extends to Konia on the edge of the barren plain of Axylon, parts of which are almost uninhabitable by reason of aridity; while on the south it swings down to the richly wooded regions of Adalia where the coast of Asia Minor bends northward in a great bay. The region included within the circle embraces parts of the provinces known in ancient times as Phrygia, Isauria, Lycaonia, Pisidia and Pamphylia.

During the summer of 1909, in the course of a journey in Palestine, Syria, and Asia Minor, under the auspices of Yale University, the writer spent six weeks in the region included within the circle. In the following paper I shall not attempt to describe the country fully; but shall merely state a few of the reasons for the importance of the region in history and legend, and then shall illustrate the present condition of the land and the people, by relating a few of the every-day experiences which befell us in our journeyings. The main purpose of this paper, however, is to describe the nature and origin of the chief freshwater lakes of Asia Minor, to explain the conditions of the German irrigation schemes near Konia, and to describe the peculiar topographic conditions which, in spite of the general aridity of the country, cause the rainfall to be sufficient for the support of really magnificent forests in certain places.

On the north, as has been said, our circle intersects the center of Phrygia, a pleasant region of maturely dissected mountains, partly

volcanic, and partly composed of tilted limestones. The mountains rise to a height of only a little over 5,000 feet in most places, but this is sufficient to cause them to be well covered with beautiful pine forests, although the surrounding plateau, at an elevation of about 3,000 feet, is wholly devoid of trees. Across one of the low passes in these mountains, according to Sir William Ramsay, ran the Phrygian portion of the famous Royal Road where formerly, day and night, un-resting couriers hastened back and forth, while laden caravans pursued their way with oriental slowness. Some of the travellers came from Smyrna and Ephesus, on the cultured Ionic seaboard, and others from Sardis, the home of opulent Cræsus. All traversed Phrygia, where Midas dwelt, and so passed on across barren plains to Boghaz



FIG. 1.—Fantastic cliffs of volcanic tuff in Phrygia.

Keui, the northern capital of the redoubtable Hittites, and thence over the mountains to Persia. Occasionally, in Phrygia, along what was probably the line of the road, six or eight deeply cut sets of wagon tracks can still be seen side by side in the solid rock. Perchance these very grooves guided the chariots of Xerxes and Darius. The road in this region passes among fantastic cliffs of curious tuff, a rock commingled of volcanic ash and lacustrine clay, laid down in a vast lake in the days when man was still a mere prophecy of the gods. In this easily worn substance, hundreds of thousands of years after its formation, the people of Midas laboriously hewed not only a great monument of solid rock for their despotic lord, and innumerable caves as tombs for their distinguished dead, but houses, granaries, fireplaces and altars for the living. In later generations

their Christian descendants, in the early centuries of our era, chiselled from the cliffs complete basilicas wherein to carry on the new form of worship derived from Palestine.

A hundred or more miles southeast of the tomb of Midas our circle passes through Konia, the ancient Iconium, embowered in gardens between rounded, naked mountains on the west and a dry treeless plain on the east. It is still the chief town of the country, as it was in the days when the earliest teachers of Christianity were expelled by rancorous Jews, who hated any teaching other than their own. A little farther south at Lystra, the rude Lycaonians welcomed Paul and Barnabas, and were about to offer them sacrifices in the belief that they were Mercury and Jupiter, but finally, in their fickle-

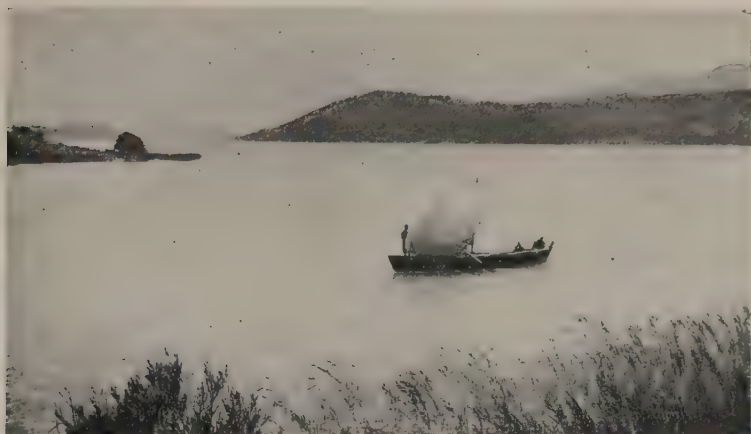


FIG. 2.—Lake Bey Shehir.

ness, sought to slay their quondam gods. On the extreme south the circle reaches Attalia and Perga, on the warm Adalian plain, at the head of a bay of the Mediterranean defended by glorious mountains. There Paul began his Anatolian wanderings. In journeying northward to Antioch he probably went by way of Kara Baulo, the Delphi of Asia Minor. Today the treasures and fanes of this mountain shrine are resorted to merely by shepherds, although in the past they teemed with busy life. Thousands of pilgrims ascended the forested valley by means of a splendid sacred way half a mile long. Their feet trod on great paving slabs from three to eight feet in length, while above them the pine-clad heights were crowned with temples and altars.

Finally, on the western edge of the circle, near modern Dineir, at

the terminus of the Meander Valley Railroad, a clear fountain bursts forth at the foot of barren limestone hills. In the dancing water of its great pool Athene frowned at the distorted image of her face, and, like a petulant girl, rather than a goddess of wisdom, threw away the flute which she was playing. Marsyas, coming perchance with his sheep, picked up the flute and put it to his mouth. The dulcet sound thrilled him. Unwitting that the breath of the goddess still lent sweetness to the simple instrument, he boasted of his skill, and boldly proclaimed himself the peer of Appollo, master of the lyre. When it came to a contest, the influence of the goddess still pervaded her flute, and it gave forth as gracious a cadence as the pipe of the god. It was only by adding his own divine voice to the strains of his flute that the startled Apollo was able to vanquish the mortal. In his conceit Marsyas had agreed that the victor might punish his rival as he would. So Apollo, most ungodlike, flayed the poor peasant alive, after binding him fast to a tree. The god was victor in that first contest; but to-day his voice is silent, while the peasant still pipes to his reed beside the clear spring and the willows.

Our travels among these historic sites began at Konia soon after the middle of July. Our first objective was the German irrigation project at Lake Bey Shehir, across the mountains about fifty miles to the west. At first, however, our course lay southeast along the base of the hills. Half a day's ride in one of the immigrant wagons with round black tops which are the common carriers of passengers in that region, brought us to Lystra, doubtless by way of the route which Saint Paul followed. The ruins there are mere fragments, lying a mile from the village. As we stopped to take lunch in the typical modern village, under the shade of thick willows beside a muddy irrigation ditch, the good-hearted Mohammedan peasants brought sweet little apricots to regale us. Eastward, beyond low hills, lay the great bare plain of the Axylon, occupying the center of Asia Minor. A few days previously the peasants whom I met out there had asked, "When will the new water come? Shall we have any water free, or must we pay for it all? Why do you come to take away the water which brings life to us?" I could not answer their queries, for as yet we had not studied the work of the German irrigation engineers for whom the peasants mistook us. Westward on our right lay a range of rounded mountains, utterly bare near Konia, but beginning to appear green as we went southward and entered the foothills, and well covered with oak scrub when we reached Uch Kilisseh at nightfall.

Perhaps Uch Kilisseh is Derbe. Its people, like those of Timothy's

old town, were certainly hospitable. They escorted us to the village guest room, a flat-roofed structure, which stands somewhat apart, so that guests may not be so near to any house as to get glimpses into the secluded quarters of the women. Our host made great preparations, and we anticipated much good cheer as we saw him and his servant bring in two large trays full of fried sweetmeats, spicy rag-outs, vegetables fried in butter, and boiled lamb with a great dish of cracked wheat. There was much whispering and confusion as the dishes came in. Our new Greek servant, looking worried in spite of the steaming feast, talked apart to the Mohammedan host, whose face took on a gloomy expression. Both men appeared uncertain what to do. Finally, the Greek came to us and whispered:

“May I bring you just a little bit of one of these dishes? The host will feel hurt if you don’t eat anything at all.”

“What do you mean?” we asked in surprise, “Why should we eat a little bit? Why shouldn’t we eat a great deal? Bring everything, and let’s see what it is.”

With a look of relief he returned to the host, whose face broke into smiles. They sat and watched us eat, and the Greek remarked to the Turk:

“I did not understand these men. This is my first day with them. I thought Europeans ate nothing but things in tin cans, kept a year or two and very nearly spoiled; or else ate milk and what they call *semolina*—food for babies. These men are ‘practised’ (literally, ‘cooked’). They eat as well as we do.” It was surprising to see how pleased the villagers were to find that we could eat their food and enjoy it. Not only here, but elsewhere, that little fact seemed in many cases to make us friends.

The next day we turned westward up the dry bed of the Charshembek Su, and soon found ourselves at the mouth of a young, narrow gorge with almost perpendicular sides. We had seen no others like it in this region. The rest of the valleys and mountains have well rounded, mature forms, implying prolonged action of rain, wind and weather, sufficient to widen all the valleys and smooth off all the sharp peaks and cliffs. Why should this one valley differ in age from the others? Why is it thus cut directly across the mountain range, in the form of a canyon of the narrowest sort, with almost perpendicular sides forming cliffs sometimes 400 or 500 feet high?

In the gorge we found parties of Turkish, Kurdish and Armenian laborers digging a large irrigation ditch, under the direction of German engineers aided by Italian “bosses,” many of whom had been in America. In the untouched part of the canyon the constricted flat

bottom, only 100 or 200 feet wide, was riotous with green things, —thickets of poplars, blackberries, plum trees and ferns, gardens of matted beans, Indian corn and tomatoes, and patches of thick alfalfa. In the “improved” portions, the canyon had lost its beauty, and the most prominent part of the scenery was a broad ditch of brown earth, empty and hideous, with measured embankments having precisely such and such an angle. Fortunately, a single rainy season will round off the corners, and raise a crop of weeds, so that beauty will ultimately return. The few people who formerly cultivated the canyon floor have accepted the new conditions as quietly as the Turk accepts most burdens which those in authority impose upon him.



FIG. 3—A Greek tomb in Phrygia, carved originally to simulate a portico with columns.

Doubtless, many console themselves with the thought expressed by a peasant in conversation with one of the engineers:

“Just think,” said the engineer, “when this work is finished you will not suffer from drought as you do now. There will be so much water that you can raise five times as much grain as before.” The peasant squatted in the shade beside the wall of an adobe house, scratched his head and thought a minute. Then he stood up, almost suddenly, and tightened his belt, as if a great thought had struck him: “Yes,” he replied, “that will be fine. When that time comes I shall only have to plant a fifth as much land as now. I can sell the rest, and still get all I need to eat. I shall have to work only a fifth as much as now.”

The hydrographic conditions of this region are peculiar. East of Konia and Derbe, as we have seen, lies the great plain of Axylon, too dry to be fruitful unless artificially supplied with water. To the

west lie several ranges of mountains, which do not trend east and west like most of those in Asia Minor, but more nearly north and south, or, near Konia, southeast and northwest. West of the first range the character of the scenery is totally different from that to the east. The hills are splendidly wooded with pine and oak, and all the land is beautiful. Between the mountains lie two pairs of lakes. The largest of the first pair is Lake Bey Shehir, a fine sheet of water thirty or forty miles long and almost half as wide, lying west of Konia beyond the mountains. From it a river flows southeastward twenty miles to Lake Kara Viren, a shallow body of water, nearly round and ten or twelve miles across. From here the apparent outlet, the young



FIG. 4—A sink-hole in the limestone country where the water disappears underground.

gorge of Charshembeli, in which the ditch is being dug, runs nearly eastward across the mountains. Sometimes water from the lake flows out to the plain this way, but often for several years at a time the gorge is streamless. Farther west, beyond another mountain range, the second pair of lakes begins with Lake Egerdir, almost as large as Bey Shehir. From its southern end, likewise, a stream flows southward, through a flat-floored valley a mile or two wide. Here and there on the western side of the main river, little streams run across the plain at right angles to the master stream. At first sight they appear to be tributaries which rise in little springs at the base of the straight line of limestone cliffs which bound the valley. Closer observation, however, shows that they flow *away* from the river. They end in dark, deep pools where the water sinks slowly underground with a gasp and gurgle. In summer the entire river is lost

in these "dudens," as the Turks call them, or "katavothrae" to use the old Greek name. In spring, however, the river continues twenty miles, and feeds the lake of Koghadeh, a perfect gem, with deeply indented coasts receding into deep bays between wooded heights. Throughout its length of four or five miles it presents views which would be counted unusually beautiful in almost any land. It, too, like Lake Kara Viren, has an outlet during the period of spring floods, or in years of high water, through a young gorge, so narrow and steep-sided that no road can follow it.

To return once more to our journey; on emerging from the gorge of Charshembah, we found ourselves on the shores of Lake Kara



FIG. 5.—The Russian village in Lake Bey Shehir.

Viren, the lower and smaller lake of the eastern pair. Here we hired a boat at the one fishing village. It was a queer craft, the size of an ordinary rowboat, but with a huge bowsprit two-thirds as long as the boat itself, and rising to a height of six feet or more. We could neither guess nor learn its use, although our two oarsmen were very ready to talk. In fact one of them was even more loquacious than the ordinary villager. For an hour he talked steadily to his companion in a voice absolutely devoid of expression, and simply maddening in its monotony. It seems to be characteristic of the country people of Asia Minor that they can talk, talk, talk, indefinitely, with nothing new to say, merely rehearsing old tales of what they did or what someone else did when he went to market or to the provincial capital.

As we rowed about the lake we were delighted with its remarkably deep bays, and bold, rocky shores plunging sheer into the water.

It had the typical appearance of a body of water that has increased in volume, thus raising the level so that the water has penetrated into the valleys, converting them into gulfs and bays, and leaving the ridges as promontories, or perchance converting some of the hill-tops into islands. We learned, too, from the boatmen, that the lake is partly drained by half a dozen underground outlets, several of which they pointed out. We expected to see the water rushing down with a roar, and were disappointed to find nothing more unusual than a shore of limestone which overhangs in a peculiar



FIG. 6—The gorge of Charshembeh, showing dense vegetation.

fashion, so that one can stand on the rock and watch big fish swim lazily underneath. Sometimes, said the boatmen, the “dudens,” as we may call the outlets, for lack of an English name, are open to an unusual extent, and the level of the lake falls slowly until almost half the bottom is exposed. In 1903 this occurred, and the villagers planted the floor of what had been the lake, and obtained phenomenal crops.

“Are you going to drain the lake?” the people of the fishing village asked eagerly. Two or three generations ago, they went on, the lake was almost dry, which was excellent for the people who lived near it, and could cultivate the exposed floor, but bad for those who lived on the plain down near Lystra and Derbe. They were no longer

able to irrigate their fields, because of the failure of the water-supply, which formerly overflowed from the lake and went down the Charshembeh gorge. A certain Pasha wanted to stop this. At that time the water was flowing out through an open hole. Into this he cast load after load of stones and mortar, hoping to block it, but in vain. Next he took beams, built a cover, and battened it down with felts, but this, too, would not work. Then he gave it up, for what was the use? Did he not well know that centuries ago his Christian predecessors, in a vain attempt to prevent the water from being lost in holes in the ground, had built a great wall to shut off from the lake the entire arm in which the dudens are located? If they had failed why should he try farther?

In these modern days, the Germans are coping with this same problem of the underground outlets. Their plan is this: Below the outlet of the large river which flows from Lake Bey Shehir, the stream will be diverted into a canal, and in this canal it will be carried around Lake Kara Viren. Thus no water will get from the upper lake to the dudens of the lower; part of the floor of Lake Kara Viren will be permanently laid bare and rendered available for agriculture; and the water which was previously wasted through underground outlets will be carried down the gorge to irrigate the thirsty plain. A capital of 20,000,000 francs has been subscribed to carry on the work, and more will be needed. The date set for opening the canal is Sept. 12, 1912. At that time it is expected to put about 350 square miles under irrigation, chiefly for wheat and early crops, since that is the kind of agriculture now chiefly practised in the plain. Fifty engineers are at work, and about 6,000 laborers.

The enterprise is supposed to be German, but one would hardly guess this from a visit to the places where work is in progress. "Here we are," said Herr Robert Winter, the chief engineer of the upper section. "These men whom you have met are my German staff. One is an Italian, one a Greek, one a Belgian, and one a Frenchman. I am the only German, and I am an Austrian. Our official language is French, and I write my reports in German only when I have something to say which I cannot express in French."

All four of the lakes which form our two pairs contain islands. This is especially true of Lake Bey Shehir, in which there are at least twenty-eight, mostly on the west side, where their wooded heights rise at the foot of lofty mountains. On one island called Kazak Adasi, or "Cossack Island," we found a colony of about 200 Russians. They still dress in Russian style—the women in skirts and bodices of striking colors, and the men in embroidered red and

white shirts hanging down outside of the trousers. The part of their costume which the men most prize is their battered straw hats, the sign that they are foreigners. Wishing to photograph two little girls in holiday attire, with big red and yellow chrysanthemums of paper in their hair, I innocently remarked to the village headman that I wanted them to stop while I took their pictures. His red face grew redder, and his corpulent body shook like jelly as he wrathfully shouted to the children, "Get out of here. Get out of sight." Then he turned to me in anger and said, "What do you mean by trying to photograph us? We are Russians." "Yes," I answered, "that is just the reason. I have photographed many other



FIG. 7—The spring where Appollo flayed Marsyas.

Russians, and I want to photograph you." His anger increased as he snarled, "Well, we are Old Russians, and we won't have anybody make pictures of us. Do you think we are going to let ourselves be put in a book? And beside all that, don't you know that it's wicked to take pictures? Christ said so, and it's in the Bible." The last statement surprised me, and I inquired farther, "Yes," was the answer, "the Bible says so, and it also says no one must drink either tea or coffee. Of course," he added, in reply to my question, "one can drink vodka. That is a different thing."

Apparently contact with Mohammedans for 150 years has caused the Russians to think that the Bible, as well as the Koran, prohibits the representation of living creatures by means of pictures. These Russians were brought to Turkey as prisoners long ago in the days

when the Empress Katharine engaged in war with the Sultan. The Turks did not know what else to do with them, and so placed them on an island in Lake Bey Shehir. How there happened to be Russian women, as well as men, among the prisoners, I have not ascertained. Living apart on their island, they have preserved their identity for over a century and a half. They furnish an admirable illustration of the way in which little bands of aliens persist here and there in secluded spots all over Turkey.

We must turn back now to the explanation, not only of the peculiarly youthful outlet gorges of Lakes Kara Viren and Koghadeh, but also of the drowned shores and underground outlets of the lakes as a whole. Apparently during somewhat recent geological times the lake region has suffered extensive block faulting. Lake Bey Shehir clearly lies on the eastern side of a fault which has depressed the lake bed several thousand feet below the mountains of Dipoilas Dag. The same may perhaps be true of Lake Egerdir, although our visit was too hasty to allow of any careful study. In both cases the smaller lakes into which the main ones discharge lie in the same valley as the main lakes, and are of the same general nature. A relatively recent movement along fault lines which originated long ago may account for the numerous islands which lie all along the west side of Lake Bey Shehir at the base of the escarpment of Dipoilas Dag, and to a less extent in corresponding positions in Lake Egerdir. It is possible, also, that faulting and the attendant movements of the earth's crust may account for the cutting of the new outlet gorges, but of this I do not feel at all certain.

Although faulting and tilting of the earth's crust may explain some of the peculiarities of these Anatolian lakes, they cannot explain all of the unusual phenomena. Three of the lakes, namely Bey Shehir, Kara Viren, and Koghadeh, the three which contain the greatest evidences of recent drowning of the coasts, are well known to lose much of their water through underground outlets, although at present these are of relatively small importance in Bey Shehir. The fourth lake, Egerdir, is reported to lose some water underground, and there are known to be "dudens" within a few miles of it. On the whole, however, it is more nearly normal than the other lakes both in the matter of outlets and in the character of its shores and islands. This leads to the conclusion that the peculiarities of the other lakes may be due in large measure to the highly soluble nature of the limestone in which they lie. At some former time the underground outlets appear to have been larger than now, or else the supply of water was smaller. Accordingly the level of the lakes

was decidedly lower than at present, and tributary streams flowed across portions of the lake floor which are now covered with water. Naturally they carved valleys in the normal fashion. Later the underground outlets were in part closed, or the amount of water supplied by rains so increased that it could not all escape through the "dudens." In either case the immediate result was a rising of the level of the lakes, and a drowning of the shores. Thus the present striking scenery was formed. The water in each of the two lower lakes apparently rose until it found an outlet, and then, flowing swiftly across the rim of the basin and down to the lowlands, carved



FIG. 8.—Turkish peasants among the seats of the Council Chamber at Kara Baulo, in the forested area near Adalia.

the new gorges which have been described above. Possibly the matter is more complex than here appears. The absence of other similar gorges in the immediate vicinity of those by which lakes Kara Viren and Koghadeh discharge, apparently indicates that the cutting of the gorges was not due directly to movements of the earth's crust. Further study may alter this conclusion, but for the present we may suppose that karst phenomena have been in the main responsible for the present unique conditions.

Before leaving this interesting lake region we must explain one other striking peculiarity. This is the heavily wooded and evidently well watered character of a triangular area having its base on the

Mediterranean Sea for fifty or seventy-five miles near the Gulf of Adalia, and its apex a hundred and fifty miles to the north in the Phrygian mountains near the home of Midas. This area includes our four lakes. No other inland region of Asia Minor can compare with it in the richness of its growth of trees, or in the beauty and abundance of its lakes. The surrounding country is an arid plateau, treeless and barren. Taken as a whole, Asia Minor may be likened to a great tray with a rounded rim. The interior forms a plateau about 3,000 feet high in its lowest parts. It consists of broad barren plains broken by volcanic cones and limestone ridges which are sometimes covered with oak scrub. At best it would be dry, because it lies in such a latitude and such a relation to the vast mass of the Eurasian continent that only during the winter, is it traversed by



FIG. 9—The wooded mountains near Adalia.

rain-bringing cyclonic storms, such as bring most of our rainfall in the United States or in northwestern Europe. In summer it lies in the subtropical zone, where it depends for rain entirely on local winds from the sea. In most places the mountainous rim shuts out such winds entirely. On the north the rim has a height of from 5,000 to 9,000 feet. From Constantinople eastward its mountain wall is almost unbroken, except for the gorges of the Sangarius, Halys and Iris rivers, too narrow to form easy entrances for roads, much less to allow the ingress of moisture-laden air from the Black Sea. On the west, the rim is somewhat lower, and much broken by long valleys draining westward across it. The Ionian end of Asia Minor is like a hand, of which the back represents the plateau, while the fingers represent lines of mountains sticking out 100 or 200 miles between valleys whose western ends have been depressed beneath the sea, and

form gulfs. The southern rim is the highest. Its limestones heights often tower 10,000 feet above the sea, and are full of little lakes and moraines—evidences of the existence of glaciers in the higher summits during the glacial period. The mountains are difficult to traverse, so difficult that the Cilician Gates, the one easy pass in the eastern portion, have become famous in history. Cyrus and Xenophon, Alexander, the Crusaders, and many other leaders of armies passed through them on their way to or from the east. Farther west, near Adalia, there is another pass, much easier. Here the mountains are bent northward, and the continuous chain is broken in two. It is as if a mighty blow from the south had shattered the mountain chain, making a hole in it, and bending the broken ends inward toward the north. Between the northward pointing ends of the bent mountains lie the lakes of Bey Shehir and Egerdir, with their smaller companions, and a little farther north Phrygia lies at the northern apex of the deflected ranges.

It is no figure of speech to say that the tradition that all things turned to gold at the hands of King Midas would never have arisen but for the Adalian break in the mountainous southern rim of Asia Minor. During the long cloudless summer the land becomes greatly heated. The temperature often rises to 100° F., as it did during some of the days when we drove across the plains northeast of Konia. The surrounding seas, on the contrary, remain relatively cool, although of course their shores are too warm for comfort, and are debilitating because of the moisture. The difference in temperature between the land and the sea occasions a difference in atmospheric pressure. The barometer over the superheated peninsula stands low, while over the water it is relatively high. Generally, the difference is not great, but now and then it is sufficient to cause air from the surrounding high pressure areas to pour strongly into the low pressure area of the land. It blows against the mountain rim, and being compelled to rise and expand, it grows cool and gives up its moisture. Thus the seaward slope is quite moist and well forested, but almost no rain gets over to the interior. On the west the wind flows up the valleys between the fingers, and brings rain and fertility in its train. Most of all it rushes up through the break in the southern rim, sucked inward as through a funnel. As it rises it sheds rain, and so supports the rich woodlands of the lake region. Day after day during August we experienced smart showers and sudden squalls on Lake Bey Shehir, and mild rains in the valleys above Adalia. The indraft continues to the Phrygian mountains. There it is met by the slighter indraft up the western valleys. The

air rises over the mountains some 5,000 feet high, and gives up the last of the moisture which it has brought from the sea. The foundation of the power and wealth of Midas lay in the fact that his land was situated at the end of the Adalian funnel.

GEOGRAPHIC INFLUENCES IN AMERICAN SLAVERY*

BY

F. V. EMERSON
University of Missouri

Slavery was never strong in the Great Valley or the Ridge Belt although society was on a slavery basis. Although the soils of the Great Valley in Virginia were fertile, the season free from frosts was about fifty days shorter than in the Piedmont or the Coastal Plain.† They were largely given over to live stock and grain. Moreover, during the colonial and the early federal period, this Valley was a roadway for northern emigrants who were passing to Kentucky and Tennessee and even to Ohio. Many of them settled in the valleys and diluted the pro-slavery population.

The graphs in Fig. 11 amplify and illustrate the expansion of slavery in Virginia. The figures in those graphs are from counties in the Coastal Plain, the Piedmont and the Great Valley and Ridge Belt. Counties with areas lying in two adjoining belts have not been included. Although there was a shifting of slave population in the Coastal Plain, the slave population barely held its own during the seventy years after 1790. Its surplus slaves were drained first into the Piedmont and western Tobacco South, and later into the western Cotton Belt. The slave population on the Piedmont shows a slow increase, but here the slave population was not doubled in the seventy years covered by the Federal census. The Great Valley and Ridge Belt, always low in slave population, show the same type of graph as that of the Coastal Plain.

The graph indicating the slave percentages shows a slave population on the Coastal Plain about equalling that of the whites. The slave density on the Piedmont increased up to 1810 owing to a larger

* Continued from *Bulletin*, January, 1911, pp. 13-26.

† A. J. Henry, *Bull.*, Q. U. S. Weather Bureau, 1906. Most of the climatic data used in this paper are taken from this useful publication.

increase of slaves than whites, and the increase in density from 1840 to 1860 is due to a similar proportionate increase of slaves. The low percentage in the Great Valley and Ridge Belt is continued through the period.

The Basins in Kentucky and Tennessee show interesting geographic responses as various factors came into operation. The first census shows a considerable population in the Louisville Basin, a response doubtless due to the influence of the Ohio River, which was a great roadway from the East to the West. Along this line of migration came a considerable number of slave owners with their

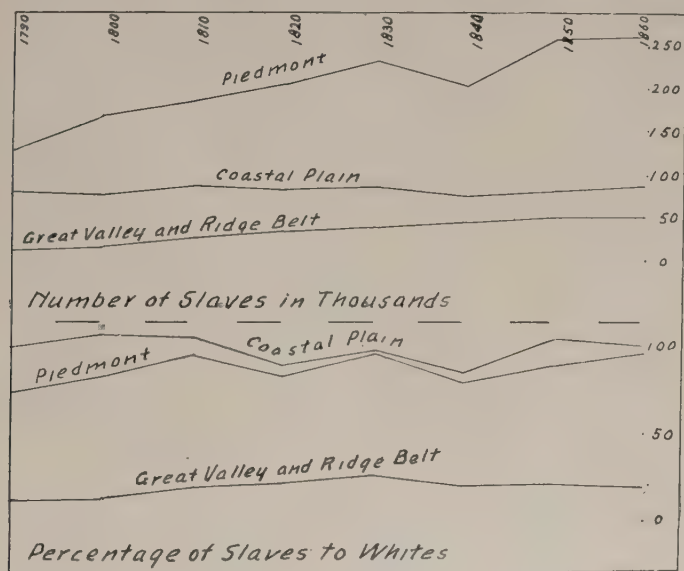


FIG. 11.

slaves. Twenty years later the slave population of the Basins were well balanced, and by 1820 the Nashville Basin had a lead which was maintained through the slavery period. These Basins constituted the principal westward extension of the old Tobacco South, and by 1840 they were producing ten per cent. of the entire tobacco crop of the United States. (Fig. 12.) The preponderance of slaves in the Nashville Basin was due not to a superiority of soils there, but to the fact that the climate allowed some cotton culture in Southern Tennessee, although it was a somewhat precarious crop. During the last decade of the slavery period, these Basins show a very rapid reduction in their slave population which had been drained into the cotton fields of the Gulf and Texas regions. Even previous

to 1850, Kentucky and Tennessee had largely become slave-raising States.

If the region to the southward of the Tobacco South in Virginia were named from the chronological succession of its slave crops, it would be termed the "Rice-Indigo South" rather than the "Cotton South." The colonial slave population of Georgia and South Carolina was largely restricted to the Coastal region, which contained a much larger proportionate area of swamps than the corresponding region in Virginia and Maryland. The colonial home government endeavored to introduce crops suitable for the warm, humid climate

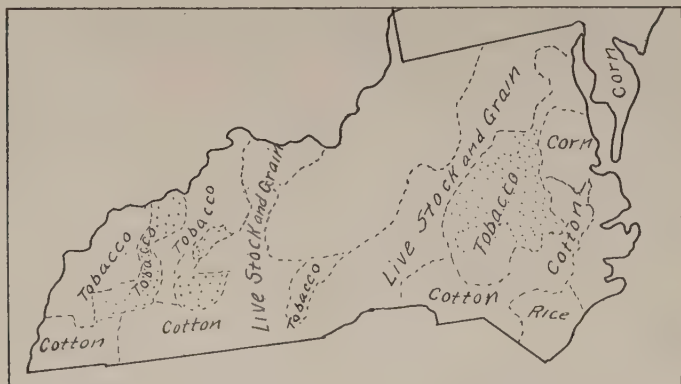


FIG. 12

Map showing the distribution of the principal crops of the Tobacco South, in 1840.
The areas producing over one per cent. of the total tobacco crop of the United States are dotted.

of this region, and cotton, indigo, ginger, flax, hemp, tobacco, olive and the vine were among the various products that were tried.*

Rice first became a staple in contrast to the preponderance of tobacco in Virginia. There was an excellent market for it in Holland, North Germany and Belgium. Two geographic factors favored the growth of rice culture. The South Carolina-Georgia coast, while not so deeply indented as that of Maryland and Virginia, is broken by numerous estuaries which lead a short distance into the interior, and by channels between the sea islands. (Fig. 14.) Water communication was therefore easily available to the planter. At an early date, the value of lands fronting on navigable streams was

*William A. Schaper, "Sectionalism and Representation in South Carolina," Report of the American Historical Association, Vol. 1, 1900. Much of the South Carolina historical matter used in this paper has been obtained from this valuable study.

fully appreciated. Much of the soil was fertile and especially adapted to rice culture. The spread of rice culture is an interesting study as an economic response to soil and topography. Its appreciation necessitates a somewhat detailed consideration of a narrow belt along the coast.

A glance at the Atlantic Coast on the south shows three types. The smooth coast of Southern Virginia and northern South Carolina, the indented coast with off shore bars of North Carolina, and the sea island coast of Georgia and Southern South Carolina.

It was this latter belt, together with a narrow parallel belt from fifty to seventy-five miles wide on the mainland, that was the seat of colonial slave development.

The sea islands are relatively small areas separated from each other by shallow winding channels. (Fig. 15.) They appear to be a variety of delta deposits, modified by sea action and by a possible slight submergence of the coast. The islands are low, rarely reaching an altitude of more than twenty-five feet. Typically the margins

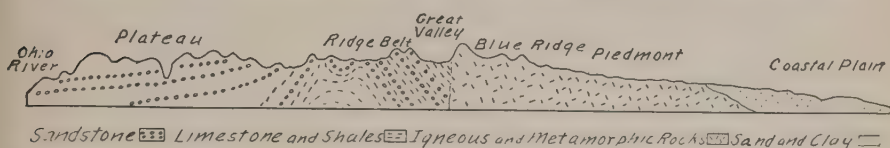


FIG. 13.

Generalized Profile and Section across Virginia and West Virginia (after Rogers).

of the islands are slightly higher than the interior. The soil in general is sandy, but is modified in places by silt, making a silt loam. There are two types of sandy soil, one of coarse sand that is generally found near the coast and the other of fine sand. All types are more or less modified by the amount of humus that they may contain. The water table is everywhere high and often approaches near enough to the surface to make even a sandy, porous soil swampy. The typical soils of the islands are the salt marsh regions which were seldom reclaimed; the fresh marsh where the water table was high and the soil, containing a high proportion of humus, was very productive when drained, and the higher sandy and loamy ridges. The fresh marsh became the principal type for rice culture; the finer sands and loams that possessed fair natural drainage were used largely for sea island cotton.*

* Most of the general facts as to soils in this and succeeding regions, were obtained from Volumes V and VI in the 10th census. The data for South Carolina is treated in Vol. VI by Harry Hammond. Data relating to soils in the Sea Island Belt were also obtained from the Soil Survey of the Charleston Area U. S. Soil Survey, 1904.

The adjacent coastal region does not differ greatly, so far as soils are concerned, from the sea islands. Soils are much the same, but, of course, the salt marsh areas become unimportant further back from the coast. Swamp areas, which are usually negligible, were very important during the rice growing period, a period that extended well towards the close of the nineteenth century. The swamp areas are found abundantly in the Lower Pine Belt which flanked the Sea Island Belt. (Fig. 16.) In this region the river swamps became prominent, not only because of their fertile soil but from the

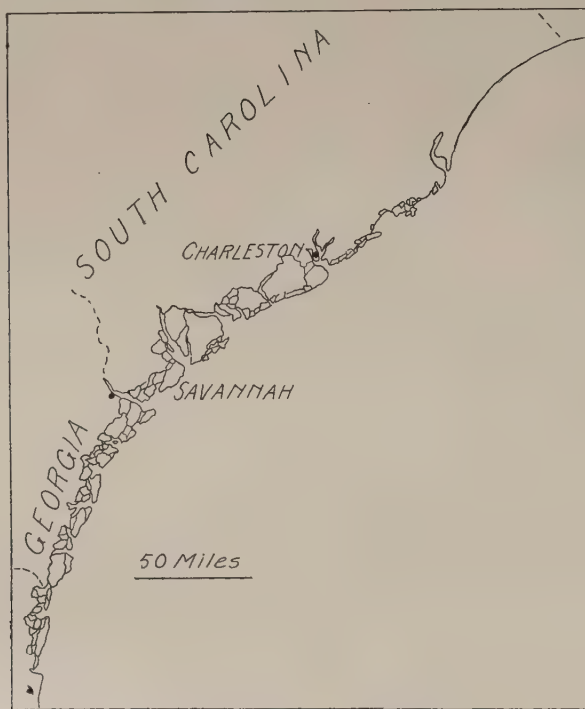


FIG. 14.

Map showing the Sea Island Coast of South Carolina and Georgia.
(From the U. S. Coast and Geodetic Survey.)

fact that they can often be easily irrigated. Often the swamps along the tidal stretches of the rivers were especially well adapted to irrigation. Upland swamps, often found on the divides, are common.

It was in this region that slavery in the Cotton South received its first great impetus, due to the rise of rice culture; not that slavery did not exist in early colonial times, but its first great expansion was due to the successful culture of rice. The colonist at first followed

the methods of the English wheat grower and sowed his rice on the well-drained divides between the swamps. After years of experience, it was found that a better crop was obtained on the edges of the swamps. It was not until 1724 that inland swamps were utilized for rice culture, and thirty-four years later that tidal and river swamps were used. Rice culture proved very profitable, and by 1748 the capital invested in land and slaves often yielded twenty to thirty per cent.

The transfer of rice culture from upland to swamps intensified the demand for slave labor. The swamps were malarial, the summers were hot, and white colonists could not endure the labor. Moreover, the swamps were densely covered with timber and

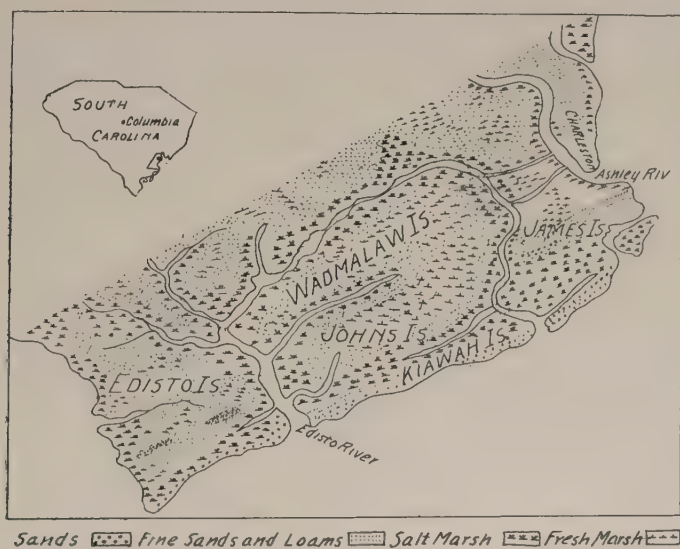


FIG. 15.

Sea Islands and their characteristic soils near Charleston, S. C. (From the Soil Survey of the Charleston area, U. S. Geol. Surv., 1904.)

thickets, and the work of clearing was arduous. In 1783 the water culture method was discovered. By this method the crop is covered several times with water, the soil is made more responsive and the weeds are kept down. This method made the labor of rice cultivation still harder. It was in the rice swamps, if anywhere, that slavery was justified and the slave population soon reached a density here that was long maintained.

About 1748 indigo culture was introduced. Encouraged by a government bounty and the excellent market among the English

cloth manufacturers, the crop quickly rose to importance. Like rice, its culture was intensive and slaves could be profitably used. The culture, however, was short-lived, and after the revolution, had mostly been discontinued. English bounties had ceased and, during the war, the English manufacturers had learned to seek their supplies from the East Indies.

The third slave crop to develop in the sea island and coast district was sea island cotton, which was first successfully cultivated

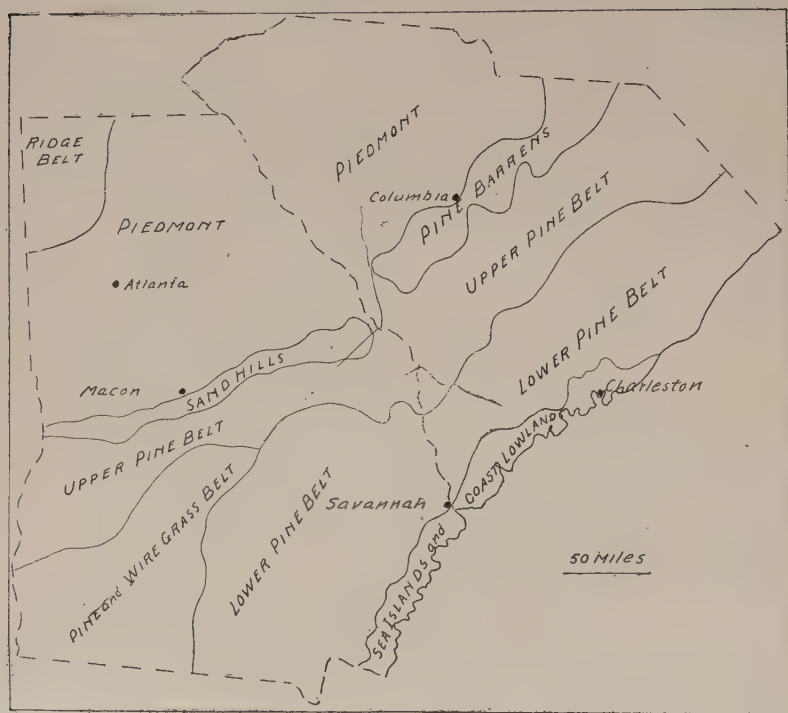


FIG. 16.

The principal Regions of South Carolina and Georgia. (Maps in Vol. 6, Part 2, 10th Census.)

about 1790.* The sea island or long staple cotton has a long, silky fiber, from which the seeds were easily detached by a simple roller gin. At least during the slavery period, its culture was restricted to the littoral of South Carolina and Georgia, the reason probably being climatic. It was cultivated on the light sandy soils and loams. Rice and sea island cotton, therefore, made available both the

* M. B. Hammond, *The Cotton Industry*, Publications of the American Economic Association. New Series, No. 1, 1897. Many of the historical facts regarding cotton have been obtained from this monograph.

Upper Piedmont Middle Piedmont Lower Piedmont Pine Barrens Upper Pine Belt Lower Pine Belt and Sea Islands

PIEDMONT sea level COASTAL PLAIN

Profile and Section Across South Carolina

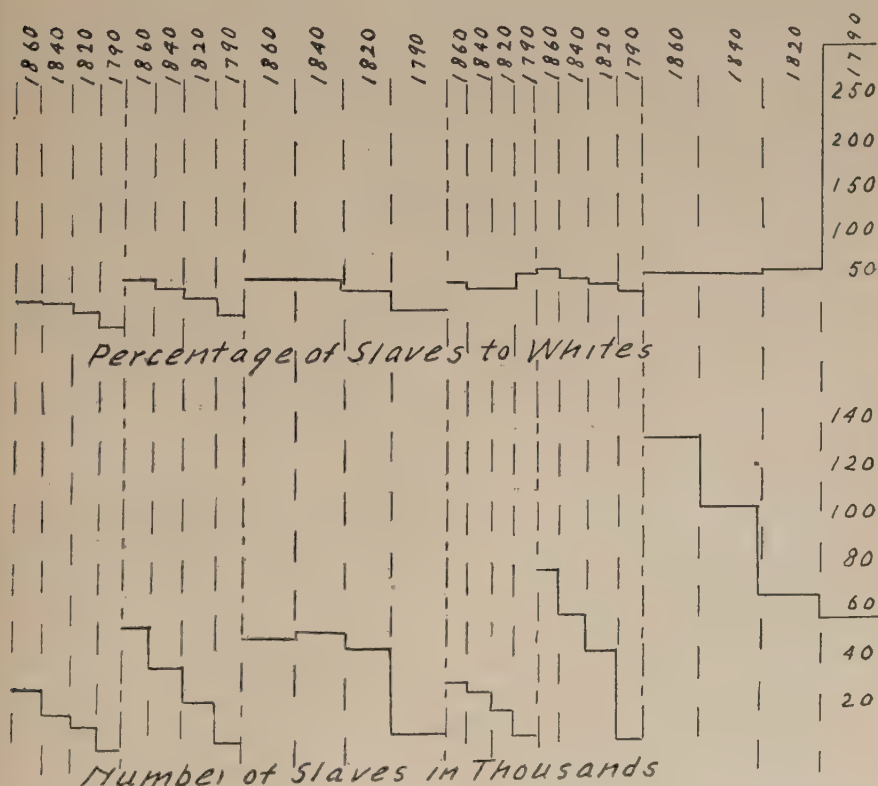


FIG. 17.

first Federal census an extremely dense slave population is shown in the sea island cotton and rice region, a density that increased in subsequent decades and was well maintained through the slave period.

Except in the rice and sea island cotton district it seems that, after the revolution, the institution of slavery was declining and likely, in time, to approach the condition already reached in the North. There was a widespread conviction, at least in the Tobacco South, that gradual emancipation would come both because of the increasing white population and because of the ultimate economic unfitness of slave labor. It was at this stage that a new slave crop became available and made possible the future expansion of slavery. Upland or short staple cotton had been grown in a small way from early colonial times, but it was used locally and not exported. The fiber of the upland cotton was less easily spun than that of the sea island variety, but the principal obstacle in its use was the difficulty in removing the seeds.

This impediment was removed by the invention of Whitney's cotton gin in about 1793. Perhaps no other invention has been followed by such prompt and far-reaching results. The world's markets were waiting for cheap cotton. A class of middlemen had arisen to market both raw and finished products. A series of great inventions, including the steam engine, spinning machines, carding machines, the power loom and calico printing, had cheapened the manufacture of textile fabrics. Added to this was the fact that, in England, the textile industry had reached the factory stage. A profitable and fairly steady market, therefore, awaited the cotton planter, and the southern entrepreneur proved himself capable of taking advantage of it. Cotton culture responded promptly to these favorable conditions and carried with it the system of slave labor.

The cotton plant is an annual that is rather sharply limited by climatic conditions. A growing season, free from frosts of from six to seven months, is required. Under best conditions, the growing season to about the middle of August should be hot and humid with a uniform daily temperature range. By this time the plant should have its full vegetative growth and be ready for fruiting. During the remaining period the precipitation should be less, and a greater temperature range will hasten the development of the boll. Speaking generally, it may be said that the parallel of latitude 37° N. is the northern climatic limit of profitable cotton culture. The States in which cotton was an important staple prior to 1860 were South Carolina, Georgia, Alabama, Mississippi, Louisiana and Texas. It will be noted from the frost and temperature maps that these States have a high summer temperature and long seasons free from frosts.

The picking often extends well into the winter.* Cotton will grow fairly well on many soils. On a clay soil, with its large moisture content, the plant is likely to grow large but produce comparatively little lint. On a sandy soil the yield is light. The best cotton soils are medium loams. These soils hold sufficient moisture during the vegetative period, while their moisture content decreases in the fruiting season with the diminished rainfall. This latter factor of diminished soil moisture hastens the fruiting of the plant.

Cotton was, perhaps, of all the slave crops the best adapted to slave labor. The various operations from planting to picking kept the slave employed from nine to ten months of the year. Picking was a critical period, since prolonged rains might injure the lint, but women and children could be employed in this part of the work. Moreover, it was an intensive crop, well suited to gang labor. It was estimated that while a single laborer could cultivate twenty acres of corn, he could cultivate only three acres of cotton.†

The conditions in Virginia, North Carolina, South Carolina and Georgia were favorable to an immediate expansion of cotton culture. There was a large, well-organized and mobile slave population which could promptly be transferred to new fields. We shall see that, during the cotton period, there were two great movements of this mobile form of capital, each movement being measurably distinct. The first movement of slaves was into the regions of South Carolina and Georgia which were most accessible to the mass of slave-holders. The slave migration was accomplished both by a sale of slaves to residents and by the movement of slaves with their owners.

Geologically, the Eastern Cotton Belt consists of two areas, the Coastal Plain underlain by sediments, mostly unconsolidated, and the Piedmont, underlain by crystalline rocks. The Piedmont soils are largely residual and similar to the soils of the Virginia Piedmont. Excepting the Sea Islands, the Coastal Plain is largely covered by the Lafayette and Columbia formations, to the varying phases of which the soil types are mainly due. The soil belts are shown in Fig. 16.

The Sea Islands and Lower Pine Belt have been discussed in connection with the rice and sea island culture. The Upper Pine Belt has a rolling surface which affords good soil drainage. Sandy loam soils with clay subsoils are characteristic of this belt. On these

* The general data as to soils and climate in their relation to cotton culture were obtained mainly from the chapter on "Climatology and Soils" in "The Cotton Plant," by Milton Whitney, *Bull.* No. 33. U. S. Dept. of Agric., 1896.

† Robert Russell, *North America*, 1857. Quoted by Cairnes (p. 50).

soils the cotton yield was moderate, but the acreage became large and the belt became known as the "central cotton belt" of this region.

Between this belt and the Piedmont is the "Pine Barrens," a wide belt in South Carolina, but narrowing in Georgia. The colloquial name suggests the sandy, infertile soil of much of this belt. During Colonial and early Federal times this belt was an effectual barrier separating the "Low Country" from the "Up Country."

While the South Carolina-Georgia coast is drowned, the submergence was not so great as in Virginia and Maryland. The rivers are tidal only a short distance from the coast. Several rivers cross the Coastal Plain and were available for shallow water navigation back to the Piedmont. Before the advent of the steamboat it was far simpler to float cotton down than to bring imports back. Steamboats began to ply on the Savannah in 1816, and steamboat traffic began during the following decade. The towns at the Fall Line (Fig. 1) were shipping centers. From them wagon roads radiated to the Piedmont, from whence came the cotton to be shipped down the rivers to the seaboard.

The Piedmont of South Carolina and Georgia was settled largely by non-slave-holders, many of them from the North. It was a cereal producing region, a region of relatively small farms as compared with the plantations of the Low Country. Slavery at first did not gain a footing on the Piedmont, largely because of the absence there of profitable slave crops. Separated from the Low Country by the effectual barrier of the Pine Barrens, the two regions developed different social, economic, and political ideas that were often antagonistic. It was not until the successful cultivation of upland cotton that slavery and its concomitant ideas became common to the two sections and they became somewhat homogenous.*

By 1810, about twenty years after Whitney's invention, there was a dense slave population on the Piedmont. The maps do not show a steady progression of the institution. It rather leaped over the northern part of the Upper Pine Belt and the adjacent Pine Barrens. A decade later, slavery on the Piedmont had expanded; it had become dense in the Upper Pine Belt and had spread into the stream bottoms even of the Barrens. At this time over one-half of all the cotton produced in the United States was grown in Georgia and South Carolina.†

* U. B. Phillips, *Georgia and State Rights*. Annual Report of the American Historical Association, 1901. Also see Schaper.

† J. D. B. DeBow, *Industrial Resources of the Southern and Western States*, 3 volumes, 1853, New Orleans; vol. 3, p. 25.

The graphs (Fig. 17) epitomize the spread of slavery in the Eastern Cotton Belt. It should be noted that the data for the first census is of relatively little value, mainly because of the fact that the counties or census districts were so large that they often included several belts, and it is therefore often impossible to determine where the slave population is grouped.*

On the Coast and Lower Pine Belts the percentage of slaves remained rather constant after 1820, although the number of slaves increased through the entire slavery period. The decades from 1820 to 1840 show a sharp increase in the number of slaves in the Upper Pine Belt and the lower Piedmont. The high profits in cotton and slave labor were somewhat enhanced by the development of transportation facilities. River navigation was somewhat improved and turnpikes were constructed at the expense of the State. The railroad connecting Charleston and Augusta on the Fall Line was finished in 1833, and other lines were building. That the Middle and Upper Piedmont did not show a more marked increase in slaves was largely due to the competition of the Western Cotton Belt.

The Pine Barrens, as would be expected, show a small slave population. Both the number and percentage of slaves in this belt would be lower were it not that the counties in this belt include some fertile bottom lands and also the Red Hills Belt, a narrow belt having a fairly fertile clay loam soil. In the Pine Barrens is Lexington County, which shows an interesting admixture of geographic and non-geographic influences on slavery. This county was the center of German settlements, the inhabitants of which were averse to slave labor, and this aversion was augmented by the rather sterile soil which made slavery unprofitable. The county long stood as a kind of a "slave island."†

The preeminence of the Eastern Cotton Belt, we have seen, lasted until 1820, when this area produced over half of the cotton in the United States. Thereafter, it continued to be important, but lost its leadership. As cotton culture and its concomitant slave system rather rapidly extended into the Upper Pine Belt and Piedmont of South Carolina and Georgia, so it even more rapidly spread to favorable regions in Alabama, Mississippi, and Louisiana, the "Western Cotton Belt."

*The boundaries of the census districts for 1790 were obtained from "A Century of Population Growth," 1909, published by the Census Bureau. The county boundaries for succeeding decades were obtained from atlases and maps so far as they could be procured. These boundaries up to about 1840 are inaccurate, both from the character of the maps and from the small number of maps accessible to the author. It is believed, however, that, by taking large units, the data are sufficiently accurate for the purposes of this paper.

† Schaper, page 392.

Many factors operated in favoring a rapid expansion of cotton culture. While cotton culture did not so rapidly exhaust a soil as did tobacco, the prevalent one crop culture without any crop rotation proved exhausting to the soils of the Coastal Plain and, to a less degree, of the Piedmont. Prices of cotton, on the whole, were falling and prices of slaves were rising.* Slavery, with its low economic efficiency, was therefore becoming unprofitable or less profitable in the older regions. The cheap and fertile lands to the westward were a strong inducement to the planter and especially his sons, who, as they set up in business, were lured westward.

The Western Cotton Belt was the theater of the greatest expansion of slavery. It included Alabama, Mississippi, Louisiana, Southern Tennessee, Southern Arkansas, and Eastern Texas. Besides the advantage of fertile soils, there was excellent water navigation reaching well into the cotton regions. The Mississippi was an adequate waterway in the western part of this belt, and many of its western tributaries were navigable. The Tennessee was navigable well into the best cotton growing regions. The Alabama, Apalachicola and many other rivers permitted shallow water navigation. The importance of water navigation and its appreciation are shown in the very numerous legislative enactments in Alabama during this period, when a large number of streams, some of them insignificant, were officially declared to be public highways.†

In the terrane of the Western Cotton Belt there are two contrasts with the Tobacco South and the Eastern Cotton Belt. The Piedmont with its fertile, durable soils becomes insignificant in area and importance. While, in the older regions, the bottom lands were important, there was no similar region that compared in area with the lowland of the Mississippi. The principal areas in the Western Cotton Belt are the Coastal Plain and the Mississippi Lowland. Minor areas will be mentioned later.

*Hammond, page 56.

†(W. E. Martin, *Internal Improvements in Alabama*, John Hopkins Univ., *Studies in History and Political Science*, Series 20, No. 4, 1902). Moreover, during this movement of slavery, there was a rather rapid extension of railroads.

(To be Concluded.)

THE DEEP SEA*

BY

SIR JOHN MURRAY, K.C.B., F.R.S., &c.

When the great *Challenger* Expedition returned to this country in 1876, after having spent three years in the exploration of the great ocean basins in all parts of the world, the one result that riveted the attention of the public was the discovery that living organisms were to be found everywhere in the ocean from the surface waters down to depths of three or four geographical miles. Men were indeed surprised to learn that large and delicate organisms belonging to nearly all marine groups could flourish in these great depths, where the pressure was over four or five tons to the square inch, where sunlight never penetrated, and where the temperature approached the freezing point. Some of these new and strange animals were reminiscent of forms hitherto known only in the fossil condition, and some of them exhibited novel and interesting adaptations to the extraordinary conditions of their environment. Fishes of frail fantastic form were in a pitiable condition when drawn up to the surface. The gases within their bodies had expanded owing to the gradual diminution of pressure, and as a consequence their eyes were blown out of their heads and their stomachs out of their mouths. It was also found that very many of these organisms had the power of emitting a pale blue phosphorescent light from special and peculiar organs—after the manner of searchlights—and of thus illuminating the otherwise eternal darkness.

The floor of the deep sea was shown to be carpeted in places by oozes composed of calcareous and siliceous shells—the houses of pelagic creatures built and tenanted in the surface waters and fallen to the bottom on the death of the tenants—or the bottom was covered with red clay, mixed up in which were hundreds of sharks' teeth and bones of whales, some of them belonging to extinct species, as well as zeolitic crystals, manganese nodules, and metallic particles and chondres of extraterrestrial origin—the tails of meteorites, in short. Lastly, it has been found that these deep-sea deposits con-

* Sir John Murray gave a lecture with the above title, before the Royal Scottish Geographical Society, in Edinburgh, on Nov. 11, 1910. By the courtesy of the *Scottish Geographical Magazine*, the larger part of the summary of his lecture, which appeared in that periodical (Vol. XXVI, No. 12) is here reproduced.

tain more radioactive matter than any of the continental rocks; in one inch of red clay there is more radium than in the whole overlying layers of sea-water four miles in depth. Scientific men had evidently invaded a new and weird field of research, attractive in a surprising degree to all who take an interest in the advance of natural knowledge. The modern science of oceanography was practically founded by the *Challenger* Expedition and has since been extended by expeditions sent out by nearly all civilized countries, by private expeditions, like those of the late Professor Alexander Agassiz and the Prince of Monaco, by Arctic and Antarctic expeditions, by telegraph ships, by the work of marine laboratories, and especially by the International Fishery Investigations in the North Sea. The physical and biological conditions of the deep sea are now known in their broad general outlines. Let us briefly glance at these conditions.

Thousands of soundings recorded from all parts of the ocean show that the sea-floor may be regarded as vast undulating plains submerged on the average about two and a half miles beneath the surface of the waves, interrupted here and there by submarine ridges and cones, some projecting above the surface as coral and volcanic islands. The greatest depth known is in the *Challenger* (or Nero) Deep in the North Pacific, viz., 5,269 fathoms, or 31,614 feet, in which our highest mountain, Mount Everest, might be placed and yet be covered by 2,600 feet of water. The greatest depth in the Atlantic is 4,662 fathoms, in the Nares Deep, north of the Virgin Islands. The greatest depth in the Indian Ocean is 3,828 fathoms in the Wharton deep, south of Java. The term "deep" is applied to those areas of the sea-floor where the depth exceeds 3,000 fathoms or three geographical miles. Fifty-six such deeps are now known including ten areas where the depth exceeds 4,000 fathoms, and four areas where the depth exceeds 5,000 fathoms, or five geographical miles.

The *salinity* of the sea is highest where drying winds blow over the surface as in the Trade-wind regions, the Red Sea and the Mediterranean, decreasing towards the poles and in the deep sea. But although the amount of salt in solution varies from place to place, and at different times of the year, the composition of sea-salts remains nearly uniform, only slight variations having been detected along continental shores, in polar regions, and in the water intimately associated with deep-sea deposits.

The *temperature* of the sea varies at the surface from 28° Fahr. towards the poles to over 80° Fahr. towards the equator. The an-

nual range of temperature is small—less than 10° Fahr.—in the polar regions, where the actual temperature is low and also in the tropical regions, where the actual temperature is high, and between these areas of small range lie two zones of wide range. This large range of surface temperature is most pronounced in those regions where there is an alternation of warm and cold currents with change of season, resulting in an enormous mortality among organisms living in the surface waters. As examples of such regions of large range may be mentioned the Atlantic coasts of North America and off the Cape of Good Hope. In these localities there is an extra large supply of dead organic matter falling to the bottom and here the greatest hauls of deep-sea animals are taken in the trawls and dredges. Here also the deposits are characterized by the formation of glauconitic and phosphatic nodules.

Beneath the surface, the temperature of the ocean-water rapidly decreases in the tropical regions—the warm surface water forming a relatively very thin film,—so that the great mass of the ocean consists of cold water, usually under 40° Fahr. in all depths greater than 1,000 or 1,500 fathoms. The deposit brought up by the dredge from deep water under the equator, with a broiling sun overhead, is so cold that the hand cannot be placed in it without great discomfort.

The *atmospheric gases*, oxygen and nitrogen, are absorbed at the surface of the sea to a greater extent in cold than in warm regions, and are then carried down to the deepest parts of the ocean by the general circulation kept up by the action of the prevailing winds of the globe. Oxygen is required by marine animals and therefore is used up as it passes down to and over the bottom in the greatest depths, while the nitrogen is unaffected. There is no deficiency of oxygen anywhere in the open ocean where a general circulation is maintained, but in basins cut off from this circulation by submarine barriers, like the Mediterranean, there may be great deficiency, and in the Black Sea there is not enough to support life in the deeper layers of water.

The ultimate *source of the food* of all marine animals is the plant life along the shores and especially in the surface waters of the ocean, where, under the influence of sunlight and chlorophyll, organic compounds are elaborated from inorganic compounds. The surface of the sea down to several hundreds of feet is crowded with myriads of minute unicellular algæ, forming vast floating meadows. The actual amount of vegetable life at the surface of the sea is probably much greater—although so inconspicuous—than that which

clothes the land surfaces. Not only are these floating meadows the feeding-grounds of surface animals, but when their dead remains fall to the bottom they supply food to the mud-eating animals which crawl over the ocean-floor, and these in their turn are eaten by predatory deep-sea creatures. Nowhere in the ocean does there seem to be an absence of life, but the regions of the very deep sea far removed from land may be called deserts when compared with the teeming life of the surface and shore waters.

Such then may be regarded as a general summary of our knowledge of the deep sea at the present time. The work of the *Challenger* Expedition over a quarter of a century ago has been confirmed and extended in many directions, but no very striking or entirely novel discoveries have been made by subsequent expeditions, and the enthusiasm for deep-sea explorations appears to have died away in quite recent years.

Let us now consider the circumstances which led to the *Michael Sars* Expedition during the present year. When Wyville Thomson and Carpenter investigated the Faroe Channel to the north of Scotland in the earliest deep-sea expeditions, they met with temperatures at three-quarters of a mile in depth varying as much as 15° Fahr. in a relatively short horizontal distance, 30° Fahr. in one place and 45° Fahr. in another. Now the *Challenger* investigations in all parts of the world seemed to render it highly improbable that two such bodies of water could exist alongside of each other without an intervening rocky barrier. In consequence the *Knight Errant* and the *Triton* Expeditions were sent out to reinvestigate this area, and a barrier reaching up to within 250 fathoms of the surface was discovered separating the cold Arctic water from the warm water of the Atlantic; not only so; but the faunæ trawled from either side of this range were found to be quite different, only a few of the 500 species captured being common to the two areas.

During the past ten years the Norwegians have been doing a great deal of work in the Norwegian Seas and have brought together great collections from deep and shallow water. It seemed desirable to have collections from different depths along the coasts of the British Isles, Europe, and Africa for comparison with those from the far north. Instruments and methods of deep-sea research have also been much improved within the last ten years. It was desirable to try these in the deep water areas of the North Atlantic, and to explore in a special manner the intermediate waters of the open ocean with modern appliances. Besides, it seemed as if the time had arrived to attempt not so much the capture and descrip-

tion of the new species as to find out the interdependence of oceanic phenomena and their bearing on the wide general physiological and economic problems of the ocean.

In November last year I offered through my friend, Dr. Hjort, to pay all the expenses of a four months' cruise in the Atlantic if the Norwegian Government would grant the use of their fishery boat the *Michael Sars*, for these purposes. The reply was favorable. The *Michael Sars* was a rather small ship for Atlantic work, being only 125 feet in length; on the other hand, she had a trained captain and crew, and the scientific staff was accustomed to taking observations even in very rough weather.

The instruments used in deep-sea work are all of special construction. Moreover, they are all removed from direct observation when at work, and it is not known until they again reach the surface whether they have properly functioned. Their proper working is therefore a source of much anxiety to the practical oceanographer. A thermometer must be reversed by a messenger at the depth at which the temperature is desired; a water-bottle must in like manner be reversed and closed at the depth from which a sample of water is required, and so on in other operations.

The ship proceeded along the coasts of Europe as far south as the Cape Verde Islands, making special observations in the Straits of Gibraltar on the way. She then proceeded to the Sargasso Sea and back to the Azores, afterwards crossing the Atlantic to St. John's, Newfoundland, and returned to Scotland, following the course of the Gulf Stream or North Atlantic Drift. The improved apparatus now in use allowed a very large number of temperature and salinity observations to be taken as well as other physical and biological observations. These details and results will be published as soon as possible.

By using a large otter trawl in the greatest depths it was hoped that large new fishes and cuttle-fishes might be captured which had hitherto escaped. This hope was not realized; but still the trawl was worked successfully down to a depth of three miles, and abundant collections were secured for future study. The fish-fauna in the coastal waters extending from the Norwegian Sea to the coast of Africa at the Canaries varied with the latitude and temperature, but along the continental slopes, between 500 and 1,000 fathoms, the same species of fishes were found over this long stretch.

Professor Helland Hansen, by means of an ingenious apparatus which could be opened and closed at any desired depth, made some interesting observations as to the distance to which the sun's rays

penetrate sea water. At 50 fathoms, during bright sunshine and after an exposure of two hours, all colors of light were found to be present, though many of the red and green rays were cut off. At 300 fathoms red and green rays could not be detected; some blue rays were present, but the light consisted principally of ultra-violet rays. At 500 fathoms some light was still detected, but at 900 fathoms, *i. e.*: about one mile of depth, the photographic plates were unaffected even after long exposure.

The *Michael Sars* sailed specially prepared to examine the fauna and flora of the open ocean down to and beyond the distance to which sunlight penetrates, and in this the expedition has been, in my opinion, a marked success. Various sizes and kinds of nets and trawls were used in the intermediate waters, some hauled horizontally, some vertically, and a great many animals were captured between 300 and 1,000 fathoms which were formerly believed to live near the bottom, such as black fishes and large red crustaceans. Occasionally as many as twelve nets were drawn along at different depths, and the results were compared with those obtained by vertical nets at the same place. These results were interesting when considered in connection with the light observations. The black and red animals captured in 300 fathoms would be invisible when viewed from the surface layers; on the other hand, the crystal-clear and blue animals which float on the surface would be invisible when viewed from the deeper layers.

Great attention was paid during the whole cruise to the young fishes and fish-larvæ found floating in the surface and sub-surface waters. This expedition was undertaken—at all events so far as I am concerned—simply with the view of increasing natural knowledge, but one can never tell when one may stumble across results of economic importance. Let me give an example. You all know that the salmon enters freshwater rivers from the sea for spawning purposes, and afterwards returns to the ocean. With the common eel it is the reverse; it lives in the fresh water and descends to the ocean to spawn, the young returning to the rivers and lakes as elvers. Now, in recent years it has been shown that the larvæ of eels are small transparent fishes known as *Leptocephali*. These are continually found in the tow-nets, but the very young stages and the ova of the eels have never been found in the ocean and the geographical position of the spawning grounds is as yet unknown. Now, along the continental slopes, and in the North Atlantic north of the Azores, we found full-grown *Leptocephali* and transformation stages, as Dr. Schmidt and others had done before us, but to the south of the

Azores we found that all the eel-larvæ were younger than any hitherto captured, and although the ova have not—so far as the examination has proceeded—been found, still our observations point, according to some of my colleagues, to the spawning area of the common eel being situated somewhere in the southern part of the North Atlantic, probably between the Canaries and Bermuda. This observation may in the not distant future have a direct bearing on economic fishery questions.

The day before the ship sailed from England a large centrifuge was purchased and fixed to the deck to be driven by a steam winch. Water was collected from different depths in the ocean by means of the water bottle, and placed in the centrifuge, which was then rotated. In this way all the minute organisms in the sea-water were collected in the bottom of the rotating tubes, and could be examined under the microscope and counted. Professor Gran found that vast numbers of unicellular plants were present in all the surface layers of the ocean—especially the *Coccolithophoridae*. As these all escape through the meshes of the finest silk used by the German Plankton Expedition, it seems certain that the general results of that expedition will require to be very considerably amended.

The samples of deep sea deposits obtained during the cruise confirm previous observations, but the stones brought up by the trawl over the area are of exceptional interest. These are being examined by Dr. Peach, and he reports that fully 20 per cent. are glaciated fragments. They consist of granite, gneiss, shales, sandstones, chalks, limestones, and flints, and some of these contain fossil remains. The condition of these fragments shows that in many instances they projected above the surface of the deposit in which they were imbedded. Dr. Peach has no doubt that these stones were carried by ice during the later phases of the glacial period to the position in which they were found. They almost all belong to the series of sedimentary, metamorphosed, and erupted rocks now found *in situ* in this country and in Ireland. But the interesting question is: Why have these fragments not been completely covered up by the shells which are continually falling from the surface? Telegraph engineers give reasons for believing that in some localities and depths the rate of accumulation is at least one inch in ten years; at this rate all rock-fragments deposited during the glacial period should have been buried in the ooze far beyond the reach of the trawl. Most probably the tidal currents, which our observations showed to exist in deep water, extend right down to the bottom and remove the

small *Globigerina* shells from any ridges. Still, there may be other explanations of the facts.

Mixed up with these stones is a remarkably large number of cinders from steamers. If steamers using coal should some day be superseded by vessels using some other kind of fuel, then the deposits in the North Atlantic would have a layer which might be called the coal-fuel layer. On the other hand, if the coal-cinders and these glaciated rock-fragments are now lying together on the floor of the ocean, geologists may in the remote future find proofs in these layers that man and steamers existed in the glacial period.

I have referred to only a few of the results and observations taken during this four months' cruise. When published in detail these will form a substantial addition to knowledge, and it is in my opinion almost certain that they will lead to other and more extensive explorations of the same nature in the immediate future.

MACQUARIE ISLAND AND ITS ROBINSON CRUSOE

The chief results of the voyage of Capt. J. K. Davis, on the *Nimrod* (May-July, 1909), under instructions from Lieut. Shackleton to try to locate certain islands in the South Pacific, shown on the charts, were reported in the *Bulletin* (Nov. 1910, p. 852). His full report on this voyage appears in the *Geographical Journal*, (Vol. 36, pp. 696-703). From this account is reproduced here Capt. Davis's description of Macquarie Island, and the solitary white inhabitant he found there. He says:

"About 545 miles from the southern extremity of New Zealand lies Macquarie Island. Capt. Hasselborough, of the brig *Perseverance*, landed there in 1809, but as he saw the remains of a wreck on the coast, it may have been visited by some navigator at an earlier date. Lying as it does in a north-east and south-west direction for a length of over 20 miles, it forms a huge breakwater exposed to the full force of the prevailing westerly winds. It is a mountain ridge rising from a considerable depth. We found a depth of 300 fathoms about half a mile from the eastern shore, shoaling rapidly as we approached the land to 40, 10, 8 fathoms. The southeast side is, for some miles, a precipitous cliff about 200 feet high, broken here and there by watercourses coming down from the plateau behind.

The plateau has an average height of about 500 feet at the southern end of the island, but there is one peak rising to a height of at least 1,800 feet. From our anchorage in Lusitania Bay, we could see the slopes (covered with green coarse grass) rising abruptly from the line of surf, and we could hear the squeaking of the king penguins and the grunting of the sea-elephants. The latter spend much of their time asleep in the long grass close to the water.

"We lowered a boat, and, after some adventures in the surf, a landing was effected. There we found the remains of two huts—both in a wretched condition, dating back to the days of the sealers; but now all was deserted and desolate. The low ground was swampy and covered with long coarse grass. The patches of swamp were filled with dense masses of vegetation, like bog mosses, but which, as I have been informed, may be dwarfed flowering plants. Two small microscopic animals have been found in this "moss"—these are known as "Water-bears" (*tardigrada*), their feet resembling those of bears. It is a curious fact that one of these is known in South Africa, North Island in New Zealand, and in Fifi—all warm climates.

"Not far from the huts were numbers of sea-elephants—huge unwieldy creatures, some 25 feet long; the larger ones appear formidable but they are not dangerous. The penguin rookery was on a small eminence. A number of young birds, about three weeks old, were huddled together, while the parents formed a circular line of defence and vigorously opposed any attempt on our part to approach the line too closely. We spent some time collecting specimens, which were brought safely on board. The following day we steamed along the coast to the northward, and at 3 P. M. we were approaching Nugget Point—a curious reef of pinnacle rocks, from which observations for latitude and longitude (with sextant and artificial horizon) have been taken by Captain Blackburn for the New Zealand Government.

"When fairly close to the shore, we could make out two huts, and we could see the figure of a man standing at the door of the smaller one. We anchored close to the shore, and a boat was lowered amid great excitement. There was a big surf, but our friend, after pointing to the best landing-place, walked into the water and assisted in beaching the boat. We learned that this solitary stranger had spent three months alone on the island. He had arrived as an oilman on board a small schooner which visits the place once a year to collect sea-elephant oil. On the last occasion, when the ship was ready to sail, MacKibben announced his intention of spending the winter on

the island. He was deaf to all persuasion, and so stores had been landed for his use, and the ship returned to New Zealand. He was an Irishman, fifty-one years of age, and had spent over twenty years in the navy. He had been to the Arctic ocean on the paddle frigate *Valorous*—a relief vessel. He was a very quaint character and seemed thoroughly to enjoy life on this wind-swept island. His hut of two rooms was warm and cosy; each room had a stove, the coal for which he had to carry from the depot—a distance of 4 miles. He had plenty of ordinary ship's stores, and, for fresh meat he used the hearts and tongues of the sea-elephants. The next day we went up to the northern anchorage, about 5 miles from Nugget Point. This is the best landing-place round the coast. We were soon on shore on a narrow strip of land which joins the mainland to a flat square-topped hill, beyond which a reef of rocks extends for some distance north. Here we obtained some skeletons of the sea-elephant which we brought on board. The following day, May 30, we were to continue our voyage at 8 A. M. I had suggested to Mac-Kibben on the previous night that he should return to civilization with us—a proposal he replied to as follows:

“‘Why should I? I’m happy enough here, and have all I want. I’m glad to have seen you, but I don’t want to leave the island.’ As we steamed away we dipped our flag to the old man, who waved farewell to us from the beach.

“The history of Macquarie Island and of its former occupation by sealing gangs is given at some length in a book called ‘Murihiku,’ by M’Nab, formerly Minister of Lands in New Zealand. The Maori name signifies the last joint of the tail, and is applied to the extreme southern part of the South Island, New Zealand. The first ‘sealing fleet’ to Macquarie consisted of six vessels. The first vessel sailed from Sydney Sept. 19, 1810; this vessel was followed by a second on October 3, and so on. Returning to Sydney in the following year, these vessels brought skins and oil in abundance; one vessel landed a cargo of not less than 35,000 skins. The masters of these vessels brought back reports of terrible weather met with off the coasts of Macquarie and Campbell islands. It was no easy matter to keep the shore gangs supplied with food and other necessities. A tale of storm and sea near this island is related about the brig *Concord* sent from Sydney with supplies for the sealing gangs on the Macquarie.” (‘Murihiku,’ p. 180.)

THE DEATH VALLEY REGION

In the *Water-Supply Papers* we find a large amount of data, carefully and patiently collected, on the volume of our streams, the quantity of precipitation, the value of afforestation, the available horse power of water for industrial purposes and so on; but we find also, in these papers, a human side that is most suggestive, touching on the grim reality of things and describing phases of nature that are most savage and in deadly antagonism to the human kind. Paper 225, "Some Desert Watering Places in Southeastern California and Southwestern Nevada," is an example of this kind.

This paper is filled with vivid sketches of a most arid and desolate region, comprising an area of 68,000 square miles, where "the scarcity of water and the importance of the knowledge of its whereabouts are indicated by the frequency with which the press records instances of death from thirst in the more remote parts of the desert." This is the Death Valley region and its surroundings, which comprise plains, that are absolute deserts, totally destitute of water, and treeless for a space representing many days' journey. Here is an extract, under the head of "Getting Lost" which gives a vivid idea of the possibilities of a desert tragedy:

"One unacquainted with the desert should accustom himself to its clear air and the resulting exaggerated detail, which makes distant objects look near. No walks without water or provisions to what appears to be a near-by hill should be undertaken without definite knowledge of its distance. Landmarks should be studied, so that they may be recognized from any point of view, and thus be known when they are reached again. Before he begins a journey that does not follow a beaten and unmistakable track, the traveler should determine his general direction by compass or map or inquiry and should adhere to that direction. The inexperienced traveler often gets at once into a panic on losing his way, and wastes his remaining energy in frantic rushes in one direction and another. This tendency to become panic-stricken should be controlled, if possible. Sit down, get out your map and compass—if you are provided with them, as you should be—and study the situation carefully before acting. At least, rest a little and think it over. If it is hot and you are far from camp, get your head into the shade of a bush or rock, and wait till night. Thirst will be less intolerable then and endurance greater. If you have camp companions who are likely to look

for you, start a signal fire by night or a smoke by day from some little eminence, and then stay by it until help comes. If you must depend on your own exertions, think carefully over all the possibilities and adopt a plan of action and adhere to it. Remember the proneness of the lost person to exaggerate the distance he has traveled. It is well to count paces and to remember that about 2,000 make a mile. You will thus have a good check on the distance that you go, and at the same time will keep your mind occupied.

"Keep your direction true by traveling toward or from some selected landmark, or by the sun during the day or a star at night, or by keeping with or against or in some fixed direction in relation to the wind. If you think these things out and have studied the country beforehand, so that you know the relation of a road, or a ranch, or a spring, or a river to a given landmark or to the points of the compass, you should have no difficulty in finding your way again. With some persons, however, the faculty of getting lost amounts to genius. They are able to accomplish it wherever they are. The only suitable advice for them is to keep out of the desert. There are safer places in which to exercise their talent. Still others have a geographic instinct and a power of geographic observation which defies time and place. They can not be lost anywhere. For such these lines are not written."

GEOGRAPHICAL RECORD

AMERICAN GEOGRAPHICAL SOCIETY

ANNUAL MEETING OF THE SOCIETY. The annual meeting of the Society was held at the Engineering Societies' Building No. 29 West 39th St., on Tuesday, January 24th, 1911, at 8.30 o'clock.

Vice President Greenough in the Chair.

The following persons recommended by the Council were elected Fellows:

W. M. Cahoone,	Robert Scoville,
Robert Hollister Chapman,	John Boulton Simpson,
W. R. Harris,	Charles Edward Souther,
Rev. Frederick Charles Meredith,	Lorillard Spencer,
Albert M. Post Mitchell,	Prof. J. E. Spingarn,
Ruel W. Poor,	Enrico N. Stein,
Paul J. Rainey,	Alexander H. Stevens,
Wallace Reid,	Robert M. Thompson,
Charles Remsen,	Samuel Thorne, Jr.,
Walter Clark Runyon,	Orville H. Tobey,
J. Sanford Saltus,	Edward Tuck,
Edwin K. Scheftel,	F. Delano Weekes.

REPORT OF THE COUNCIL

The Annual Report of the Council was presented and read by its Recording Secretary, Mr. Levi Holbrook:

January 19, 1911.

To the American Geographical Society:

The Council respectfully submits the following report for the year 1910:

The number of Fellows on the 1st of January was 1,254. The additions during the year were 60. The losses by death, resignation, etc., were 104, and the total Fellowship on December 31st was 1,210, of which number 359 were Life Fellows.

There have been added to the Library 840 books, 3,109 periodicals and pamphlets, 322 maps and charts and 20 atlases.

Seven meetings of the Society were held, at which addresses were made by Rear Admiral Colby M. Chester, U. S. N., retired, Prof. James H. Brewster, Prof. A. V. Williams Jackson, Sir Ernest Shackleton, Mr. Henry G. Bryant, Mr. Frederick Monsen and Mr. C. J. Blanchard.

The Cullum Geographical Medal has been awarded to Prof. Dr. Hermann Wagner of Göttingen, Germany, in recognition of his great services to the science of geography.

The Charles P. Daly Medal has been awarded to Grove Karl Gilbert, LL.D., of Washington, D. C., in recognition of his many notable contributions to knowledge in the field of physical geography.

There have been published in the *Bulletin*, besides the Geographical Record, the Scientific Notes, and the Book Reviews and Bibliographical Lists, 49 original papers.

The Society's collection of maps and other appliances used by teachers of geography in European schools, which was exhibited in New York, in the winter of 1908-1909, was exhibited later in ten Universities and Normal Schools of the Middle West, and during the past year has been on exhibition at the Leland Stanford, Jr., University and the University of California, the University of Virginia and the Northern Illinois State Normal School of DeKalb, Illinois, and will continue to be shown elsewhere as applications are made for it. Ten institutions, from Massachusetts to Nebraska, have already applied and will receive the collection in due time.

The Society has received twenty-five thousand dollars bequeathed to it, for its corporate purposes, by its late respected Vice-President, Darius Ogden Mills.

Members of the Council and friends of the Society, who prefer not to be named, have continued to make generous contributions to the special Building Fund established last year and work has progressed on the beautiful new edifice, at 156th Street and Broadway, which is to be the future home of the Society. It will probably be ready for occupancy during the summer of 1911.

For the financial condition of the Society reference is respectfully made to the report of the Treasurer which is herewith presented.

All of which is respectfully submitted.

CHANDLER ROBBINS,
Chairman.

LEVI HOLBROOK,
Secretary.

REPORT OF THE TREASURER

The report of the Treasurer, Mr. Henry Parish, Jr., for the year 1910, was read as follows:

GENERAL ACCOUNT

The Treasurer respectfully reports:

On January 1st, 1910, there was on hand a balance of...		\$2,384.71
During the year there have been received for Fellowship Dues, Sales of Publications, Interest on Investments, &c., &c.....	\$22,393.07	
Legacy from the Estate of D. O. Mills	\$25,000.00	\$47,393.07
Total		\$49,777.78
There have been expended for Salaries, Meetings, Library, Publications, House Expenses, Insurance, Postage, &c.	\$22,016.04	
Invested in guaranteed mortgages	\$27,300.00	\$49,316.04
Balance on hand December 31, 1910		\$461.74

The Reports of the Council and the Treasurer were approved and ordered on file.

REPORT OF THE SPECIAL COMMITTEE

The Report of the Special Committee, charged with the duty of selecting candidates for the offices to be filled, was presented and read:

NEW YORK, DECEMBER, 15TH, 1910.

The Special Committee, appointed November 17, 1910, to nominate and recommend to the Society suitable persons to be elected in January, 1911, to fill vacancies then existing in its offices, report that they recommend the election of the following named persons to the offices designated:

President, ARCHER M. HUNTINGTON, for term expiring 1912	
Vice-President, JOHN GREENOUGH, " " 1914	
Treasurer, HENRY PARISH, JR., " " 1912	
Domestic Corresponding Secretary, ARCHIBALD D. RUSSELL, " " 1914	
Councillors, JOHN S. BARNES, JAMES B. FORD, OTTO H. KAHN, WALTER B. JAMES, M.D., FRANCIS LYNDE STETSON, }	" 1914

[SIGNED.] HAMILTON F. KEAN, }
ANDREW G. AGNEW, } *Committee.*

The vote of the Society was unanimously in favor of the persons recommended by the Council, and they were declared duly elected.

Vice-President Greenough, then introduced the speaker of the evening, William Edgar Geil, LL.D., who addressed the Society on "The Land of the Great Wall." Stereopticon views were shown.

The Society then adjourned.

AMERICA

OUR COAL-MINING INDUSTRY IN 1910. According to reports received by the U. S. Geological Survey from coal-mine operators and others familiar with the industry, the production of coal in the United States during 1910 was between 475,000,000 and 485,000,000 short tons, a considerable increase from the output of 459,715,704 short tons in 1909 and approximately within 1 per cent. of the maximum previous record of 480,363,424 tons, produced in 1907.

The most important factor influencing the industry was the prolonged strike in Illinois and the Southwestern States. Notable increases in production were made in the western counties of Kentucky, in western Pennsylvania, and in Ohio, West Virginia, Alabama, Colorado, New Mexico, and Montana. The States whose production was reduced by the strike were Illinois, Kansas, Missouri, Arkansas, and Oklahoma. Of the total production in 1910 the anthracite mines of Pennsylvania contributed nearly 83,000,000 short tons and the bituminous mines between 390,000,000 and 400,000,000 tons.

APPRAISING OUR COAL LANDS. The U. S. Geological Survey, in November classified 1,141,071 acres of western lands as "Coal Lands" with an appraised value of \$78,111,900. The total area now classified by the Survey as coal land, is 12,211,131 acres, having an appraised value of \$495,210,779. These coal lands, at the minimum price formerly received, would have a value of only \$189,942,114, the difference in favor of the Government being \$305,268,665. The total area of coal lands at present withdrawn from sale amounts to 83,714,235 acres.

MINING IN ALASKA IN 1910. The annual report on the mineral resources and production of Alaska for 1910 is now in preparation under the direction of Alfred H. Brooks, of the U. S. Geological Survey. The value of the mineral output in 1910 is estimated at \$17,400,000; the value in 1909 was \$21,146,423. Of this, the estimated value of the gold output in 1910 was \$16,360,000; that of 1909, \$20,371,078. The copper production in 1910 is estimated to have been 5,600,000 pounds, valued at about \$740,000; that of 1909 was 4,124,705 pounds, valued at \$536,211. The value of the other mineral products, including silver, lead, gypsum, marble, and coal, is estimated at \$300,000—an increase over that of 1909. The total value of the Alaska mineral production since 1880, when mining was begun, is, in round numbers, \$186,000,000, of which \$179,000,000 is represented by the value of the gold output.

The decrease in the value of the mineral production is due to the falling off in the output of Fairbanks, Seward Peninsula, and some of the smaller placer districts. Except in these camps and the coal fields, the output from all the mining districts increased. Copper mining was prosperous and much development work was done on the copper deposits. More has been accomplished than in any previous year in the development of auriferous lodes. Much work was also done toward installing large mining plants for working low-grade placer deposits. As in previous years, the lack of cheap fuel is the one great hindrance to the advancement of the mining industry in Alaska.

A WYOMING CONGLOMERATE. J. L. Rich ("The Physiography of the Bishop Conglomerate," *Journ. Geol.* Vol. XVIII, 1910, pp. 601-632) has described a conglomerate and its relationships in the plateau region north of the east end of the Uinta Mountains. He shows clearly that it is a subaërial deposit not at all connected with the phenomena of glaciation and that before it was de-

posited there was a period of planation followed by late Miocene or early Pliocene mountain building and a change of climate toward aridity, the Bishop conglomerate being a desert fan deposit. Following this there have been three periods of erosion separated by two periods of aggradation, the variations being interpreted as due to changing climate. L. M.

MR. RADFORD IN NORTHERN CANADA. Mr. Harry V. Radford who has spent the past two years in Northern Canada writes to the Society that in October last, while paddling down the Peace River with one white assistant, he was caught by the ice on Nov. 1, and frozen in at Fort Vermilion. He left that station on Dec 1, with three men, two sleds and eight dogs for Fort Smith, crossing through the heart of the wood bison habitat, by a route not previously followed by any traveler. Much new data were collected concerning the wood bison and some geographical discoveries were made, which will appear upon the map he is preparing of the country west of Slave River. Though the chances of receiving fresh supplies, of which he is in need, are somewhat dubious he proposes next summer to go, with two assistants, as far as Baker Lake, by canoe from Great Slave Lake, and to carry out as much of his plan of exploratory travel as is possible.

THE PANAMA CANAL. The Isthmian Canal Commission has issued a small pamphlet, "The Panama Canal" containing the chief facts relating to the Canal. The following data are taken from it:

The entire length of the Canal from deep water in the Atlantic to deep water in the Pacific is about $50\frac{1}{2}$ miles. Its length on land is about $40\frac{1}{2}$ miles. In passing through it from the Atlantic to the Pacific, a vessel will enter a channel with a bottom width of 500 feet in Limon Bay, follow this for about seven miles to Gatun where it will enter a series of three locks, and be lifted 85 feet to the level of Gatun Lake. It will sail at full ocean speed through this lake, in a channel varying from 1,000 to 500 feet in width for a distance of about 24 miles, to Bas Obispo, where it will enter the Culebra Cut. It will sail through the Cut, a distance of about nine miles, in a channel with a bottom width of 300 feet, to Pedro Miguel. There it will enter a lock and be lowered $30\frac{2}{3}$ feet to a small lake, at an elevation of $54\frac{2}{3}$ feet above sea level, and will sail through this for about $1\frac{1}{2}$ miles to Miraflores. There it will enter two locks in series and be lowered to sea level, passing out into the Pacific through a channel about $8\frac{1}{2}$ miles in length, with a bottom width of 500 feet. The depth of the approach channel on the Atlantic side, where the tidal oscillation does not exceed $1\frac{1}{2}$ feet, will be 41 feet at mean tide, and on the Pacific side, where the maximum oscillation is 23 feet, the depth will be 45 feet at mean tide.

The Gatun Dam, which will form Gatun Lake by impounding the waters of the Chagres and other streams, will be nearly $1\frac{1}{2}$ miles long, measured on its crest, nearly $\frac{1}{2}$ mile wide at its base, about 400 feet wide at the water surface, about 100 feet wide at the top, and its crest as planned will be at an elevation of 115 feet above mean sea level, or 30 feet above the normal level of the Lake.

Gatun Lake will cover an area of 164 square miles with a depth in the ship channel varying from 85 to 45 feet. Throughout the first 16 miles from Gatun, the width of the channel will be 1,000 feet; then for 4 miles, it will be 800 feet, and for 4 miles more 500 feet, when the entrance to Culebra Cut, at Bas Obispo, will be reached. The water level in the Cut will be that of the Lake, and the bottom width of the channel will be 300 feet.

The Canal Zone contains about 448 square miles. It begins at a point three marine miles from mean low water mark in each ocean, and extends for five miles on each side of the center line of the route of the Canal. Of the 448 square miles of Zone territory, the United States, owns about 322 square miles.

There will be 12 locks in the Canal, all in duplicate three pairs in flight at Gatun, with a combined lift of 85 feet; one pair at Pedro Miguel, with a lift of $30\frac{2}{3}$ feet, and two pairs at Miraflores, with a combined lift of $54\frac{2}{3}$ feet at mean tide. The dimensions of all are the same— a usable length of 1,000 feet, and a usable width of 110 feet. Each lock will be a chamber, with walls and floor of concrete, and water-tight gates at each end.

No vessel will be permitted to enter or pass through the locks under its own power. Electricity will be used to tow all vessels into and through the locks, and to operate all gates and valves, power being generated by water turbines from the head created by Gatun Lake.

The time required to pass a vessel through all the locks is estimated at 3 hours, one hour and a half in the three locks at Gatun, and about the same time in the three locks on the Pacific side. The time of passage of a vessel through the entire Canal is estimated as ranging from 10 to 12 hours, according to the size of the ship and the rate of speed at which it can travel.

The total excavation, dry and wet, for the Canal as originally planned, was estimated at 103,795,000 cubic yards, in addition to the excavation by the French companies. Changes in the plan of the Canal, made subsequently by order of the President, increased the amount to 174,666,594 cubic yards. On April 1, 1910, the excavation exceeded 103,000,000 cubic yards, nearly the entire amount called for in the original plan.

The amount of material taken out by the Old and New Panama Canal Companies was 78,146,960 cubic yards, of which it is estimated 29,908,000 cubic yards will be utilized in the adopted plan of Canal.

In the month of November, 1910, there were approximately 45,000 employees on the Isthmus on the rolls of the Commission and of the Panama Railroad, about 5,000 of whom were Americans. There were actually at work on December 7, 1910, 35,737 men, 29,686 for the Commission, and 6,051, for the Panama Railroad Company.

ARTESIAN WATER POSSIBILITIES IN ARGENTINA. Señor Ramos Nexia, Argentine Minister of Public Works, has adopted a plan for making surveys for the determination of artesian water conditions along the lines of the national railroads. These railroads, already far advanced, are being built because the Government intends to provide convenient communication with the vast agricultural and grazing lands of Argentina and Patagonia which are remote from the more populous districts of the Republic. The need of pure water for locomotive use as well as for other purposes has thus been made critically evident.

Señor Nexia accordingly contemplates topographical and geological surveys, similar to those carried out by our own Government survey. *Science* (Feb. 10, 1911) says that last summer Señor Nexia applied to the U. S. government for the services of a geologist and such assistants as he might need, and our government has responded cordially to that request. Mr. Bailey Willis has accordingly entered into a contract for the term of two years, to execute topographical and geological surveys for the specific purpose of ascertaining artesian water possibilities in those districts which the minister may designate. With him are associated Mr. Chester W. Washburne, of the U. S. Survey, Mr.

J. R. Pemberton, of Stanford University, and Mr. Wellington D. Jones, of Chicago University, as geologists, and Mr. C. L. Nelson and Mr. W. B. Lewis, as topographers, and the party sails shortly for Argentina to enter upon the work. While these surveys have a specific purpose, their possibilities of usefulness in developing the natural resources and encouraging settlement in the regions surveyed will not be overlooked, and the work will be founded on these scientific studies, upon which alone practical conclusions can safely rest. Thus it is hoped that a definite contribution to knowledge in geography and geology may be made.

EXPLORATIONS IN DUTCH GUIANA. In June, 1908, Lieut. Eilerts de Haan set out for the Upper Surinam River to connect the triangulation of the Dutch expedition in the east (Tapanahoni and Gonini) with the western surveys (Copename and Saramacca) and to cross if possible the watershed to the basin of the Corentyne river. This plan was successfully carried out. Lieut. de Haan found that at Goddo two streams, the Gran Rio and the Pikien, unite to form the Surinam. Both these streams were ascended and it was proved that the Wilhelmina Range is not connected with the Tumac-Humac Mountains. The Wilhelmina Range extends from east to west for about sixty miles with a breadth of about twenty-five miles. The *Tijdschrift* of the Royal Dutch Geographical Society, (Vol. 27, Nos. 3 and 4) gives details of the triangulation, a list of plants collected, etc. The rivers are full of falls and rapids and the country is thickly wooded. The sad news comes that Lieut. de Haan has since died as he was about to start on a new expedition into the interior of the colony.

AFRICA

SLEEPING SICKNESS. Under the title "Sleeping Sickness: How to avoid Infection," The Sleeping Sickness Bureau of London has printed a small pamphlet for the use of travellers and residents in Tropical Africa. It gives an account of *Glossina palpalis* and other biting flies, tells how to recognize the species which conveys sleeping sickness, describes the various circumstances under which travelers are liable to be bitten and illustrates methods of protecting Europeans from the disease.

FREIGHT AUTOMOBILES IN THE CONGO. The most ambitious of the projects for extending freight automobile routes through parts of the Belgian Congo is now far advanced. The route, 700 miles long, which is to join the Congo and the Nile Rivers, is completed for about half the way. The road starts at the head of navigation on the Rubi tributary of the Middle Congo, extends to the northeast across the headstreams of the Mobangi, the greatest Congo affluent and will go on to Rejaf on the Nile, a station some forty miles south of Gondokoro to which steamers from Khartum are now making regular trips. The Belgian Congo, for some years, has promoted the building of such routes in advance of the development of an adequate system of railways. It is desired to dispense as rapidly as possible with costly transportation on the backs of men. One of these routes was started from Stanley Pool to the southeast with the intention of penetrating the Kwango-Kasai country which has rich resources in rubber. Another project was to extend an automobile line from Lusambo at the head of navigation on the Sankuru affluent of the Kasai with the idea of tapping the mineral region of southern Katanga. This project may not be carried out in view of the present plans for the construction of a railroad to connect Lusambo

with Katanga. For some years the Congo Government has given much attention to the development of an automobile freight carrier well-adapted for tropical conditions.

Types of machines carrying from two to three tons of freight were finally evolved which seem fairly well to answer the requirements. The best of roads are essential for this service.

ASIA

DR. MUSIL'S EXPLORATIONS IN ARABIA. The *Geographical Journal* reports that Dr. Alois Musil carried out in 1910, explorations in northern Arabia in the region adjoining the Hejaz railway. Leaving Vienna in April, with Dr. Leopold Kober, geologist, and Rudolf Thomasberger, cartographer, he proceeded by way of Beirut and Damascus to Maan, where he organized his caravan. During two months he made a thorough examination of the imperfectly known area extending from Maan southwards to Al Gaw, and from the Red Sea eastward to Teima and the Wadi Sirhan, and including the Biblical land of Edom. The journey was not without danger in the country of fanatical tribes towards the south, whose suspicions were aroused. There had been no rain for four years, and the temperature on one occasion rose to 131° Fahr., but the traveller was able to secure a large amount of ethnographical and linguistic material, lists of names, drawings, copies of inscriptions, etc. One result Dr. Musil believes, is the identification of the true Biblical Sinai. His companions carried on work in other departments. Plants and insects were collected and geological investigations made, the country being found to consist of granite, sandstone and basalt, succeeding each other from west to east. The mapping was effected by plane-table and compass, the use of the theodolite being found impossible.

NEW METEOROLOGICAL OBSERVATORY IN THE PHILIPPINES. The Philippines Weather Bureau has established a new meteorological and geodynamical observatory, at Baguio, under the direction of the Manila Observatory.

ORGAN OF THE GERMAN ASIATIC SOCIETY. The periodical *Asien*, the organ of the German Asiatic Society, formerly published by the house of H. Patel, has been suspended, as the Society decided to start a new journal on Oct. 1, last, with the name *Asiatische Zeitschrift*, which will be printed by Süsserott, Berlin.

FAMINE IN CHINA. The scene of the famine reported in China this Winter, is some ways inland from the east coast and from 100 to 170 miles north of the Yangtse River. Here in the northern part of Kiangsu and Anhwei Provinces, in an area about four times as large as our Long Island, live 3,000,000 people, most of them humble farmers, each family tilling an acre or two and, by intense methods of cultivation earning, in normal seasons, a comfortable subsistence. Their home is on a low alluvial plain, cut up in all directions by dikes and canals. In this region, last summer, occurred the heaviest rainfall ever known there. Floods descending from the surrounding hill districts covered the low fields and drowned the crops. The supply of food for this winter was lost and many thousands of families were suddenly thrown upon the charity of the world. According to newspaper reports, the Chinese Central Government and the people have been contributing much relief, but the amount is still insufficient. An international committee at Shanghai is trying to raise \$1,000,000 to buy and forward food. The China Inland Mission of London recently announced that it would send to the Shanghai Committee all sums contributed to the famine fund.

AUSTRALASIA

AUSTRALIAN METEOROLOGY. The Commonwealth Bureau of Meteorology, under Mr. Henry A. Hunt, is doing excellent work and publishing much of interest. *Bull.* No. 3, issued in Nov., 1909, deals with "The Remarkable Flood Rains over Southeastern Australia during the Winter of 1909." The weather conditions which gave rise to these flood rains are clearly described, and illustrated by means of a series of weather maps. *Bull.* No. 4, issued in Dec., 1909, is a discussion of the "Monthly Distribution of Australian Rainfall." This is an excellent presentation of the rainfall types and seasons of Australia. A chart shows, for each station, the monthly distribution of rainfall in percentages of the annual mean, the curve for the station being shown plotted on a small square of coordinate paper. By this means, the limits of the winter and summer rain types are clearly determined. A precisely similar method was adopted by Mr. W. G. Reed in his recent study of South American rainfall types (*Quart. Journ. Roy. Met. Soc.*, Jan., 1910). A rainfall map of Australia for 1909 has also recently been issued.

R. DEC. W.

POLAR

AUSTRALIAN ANTARCTIC EXPEDITION WILL EXPLORE WILKES LAND. According to *Nature* (No. 2,152, Jan. 26, 1911) the starting of the Australian Antarctic Expedition seems now assured by the subsidies promised by the Australian Association for the Advancement of Science. The expedition will be under the command of Dr. Mawson, and it will enter the Antarctic field which now promises the most useful results. Many attempts have been made to discredit the existence of Wilkes Land, and it is obvious that Wilkes reported land farther to the north than it exists; nevertheless, his narrative offers convincing evidence that his expedition met land in that part of the Antarctic region. The Shackleton expedition has proved the extension of the land further west from Cape Adare, than any other expedition, and Dr. Mawson proposes to follow this coast-line further to the west, which was one of the unfilled parts of the programme of the *Discovery* expedition. The German Antarctic Expedition, under Prof. von Drygalski, established the existence of continental land south of Kerguelen. No accessible part of Antarctica offers such promising results as that selected by Dr. Mawson. The development of wireless telegraphy has already led to the suggested establishment of an Australian meteorological station on that part of the Antarctic coast, and this observatory may be hoped for ultimately.

GLOBUS MERGED WITH PETERMANN'S MITTEILUNGEN. *Globus* announces in its issue of Dec. 29, that with that number which completes Vol. XCVIII, it ceases to exist as a separate periodical. It now becomes a part of *Petermann's Mitteilungen*. The publishers say that the Gotha periodical will continue to give due attention to ethnographical science, which for so many years has been the leading feature of *Globus*.

GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY)

BOOK REVIEWS AND NOTICES

AMERICA

Our Inland Seas. Their Shipping and Commerce for Three Centuries. By James C. Mills. xv and 380 pp., 69 illustrations and map. A. C. McClurg & Co., Chicago, 1910. \$1.75.

The St. Lawrence river is a natural passage-way to the central areas of the United States, and along the courses of this stream there has passed a wonderful procession of craft from the Indian dugout to the finely appointed steamships and specialized bulk carriers of to-day. The story of "Our Inland Seas" is the story of this panorama of three centuries. Over 700 vessels that represent stages of development of lake-going vessels are mentioned in the book, and in all cases where there is a radical departure from the type of the period, the ship's inception, as well as its important features of size and equipment is described. In many instances the entire life of the vessel is given, as, for instance, the story of the *Griffin*, the pioneer sailing vessel, which was built under stress of the hostility of rival fur traders and jealous Indians and which met a tragic ending on its first voyage.

The author confines himself largely to the development of shipping and at certain points when the stride forward is marked, as, for example, following the application of steam to navigation or the advent of the screw propeller, the history of the invention, although it takes one far from the Lakes, is briefly detailed. Most of the romance of the early exploration of the new world centers about one or another of the river highways which led the adventurers into the wilderness, and the neighborhood tales of exploration, of tragedy, of adventure and of superstition can never grow wearisome when the pen is guided by a sympathetic narrator.

In the consideration of the effects of railroads on the traffic of our great rivers the chapter on "Competition by the Railroads" is interesting. The decline in shipping on the Lakes following the advent of parallel lines of railroads was marked. The attempt to win back the favor of the public by building splendid vessels was unsuccessful; but the opening of the Sault Ste. Marie canal which allowed the development of the great natural resources about Lake Superior gave the needed impetus to the traffic of this great waterway. Again the advocates of the fourteen-foot waterway from the Lakes to the Gulf may well consider the statement that the limit of fourteen feet imposed by the Welland and other canals "was a severe handicap to the successful operation of many steamers," and lightering had to be adopted in order to get a vessel through the canals.

The book contains a great fund of information concerning the ships and ship-masters, present and past, of the Great Lakes and with the vessels there

are correlated the stories of exploration, of piracy, of war and of disaster with which the inland seas abound. It is a wonderful story, carefully and interestingly told and illustrated with a large number of well-selected pictures.

R. M. BROWN.

Barbarous Mexico. By John Kenneth Turner. 340 pp., 18 illustrations. Charles H. Kerr & Company, Chicago, 1911. \$1.50.

It would be entirely proper to call the country which was described in "Fernando Cortes and the Conquest of Mexico, 1485-1547" (reviewed in the *Bulletin*, Vol. XLII, No. 9, pp. 693-695) *barbarous Mexico*; but in the course of four centuries a few changes have occurred which make the adjective in the title of Mr. Turner's interesting book seem harsh rather than apt. The author has brought to light some facts of great importance. At the same time it is to be regretted that he has not so thoroughly mastered his subject as to realize that it is quite unnecessary to "bear on" when dealing with such topics as the slaves of Yucatan (and, by the way, we cannot believe in a "*Camara de Agricola de Yucatan*," though quite ready to accept a *Camara de Agricultura*), the extermination of the Yaquis, the contract slaves of Valle Nacional, repressive elements of the Diaz machine, the Diaz-American press conspiracy, and American persecution of the enemies of Diaz.

M. W.

AFRICA

Sahara Algérien. (2 vols.) Par E. F. Gautier. Tome 1. x and 371 pp., 65 figures and maps, of which 2 maps in colors, and 96 photo-engravings. Large 8vo. 1908. Tome 2. iv and 326 pp., 83 figures and maps of which 1 map in colors, and 74 photo-engravings. Large 8vo. 1909. Arnold Colin, Paris. \$3.

The division of the Sahara into an Algerian and a Sudanese part which has been adopted for the two volumes of this report was originally an arbitrary one, and was caused by the difference of the respective itineraries of the two authors. Having traveled together for part of the way, while in the beginning Mr. Gautier, and at the end Mr. Chudeau, did a considerable amount of the traveling alone, each of them, when it came to the writing of the book, contributed the descriptions of those parts of the country which he knew best from personal acquaintance. Geographical reasons, however, justify that plan because, geologically as well as ethnologically, considerable differences exist between the two regions named. Whenever, as in the case of prehistoric ethnology, the absence of such differences calls for a joint treatment of the two divisions, either of the authors feels free to cover the whole territory in the respective chapters, regardless of the general division of labor.

Geologically, the northern division consists of Cretaceous and Devonian sandstones and limestones, while the more southerly and central districts of the Sahara are formed of metamorphic, archæan and eruptive rocks. The surface forms, too, are different. In the north, the quaternary deposits are cut by the deep and steep beds of the wadis, while farther south fossil dunes dominate. This would mean that in the north, the desert succeeded the steppe, while in the south the steppe succeeded the desert. The great number of stone axes found in these regions seem to indicate that in a comparatively recent past the climate of these regions was more favorable for agriculture than it is now; these axes are found together, as a rule, with iron implements allowing us to assume for these regions a longer duration (or later occurrence) of the neo-

lithic period than elsewhere, possibly down to about 2,000 years ago. As no fundamental climatic change has come to notice of these regions within that time, the author supposes that it was the progress of the dunes from the neighboring desert which brought about a change in the quality of the soil that put an end to the pursuit of agriculture in these regions.

The special part of the book is given over mainly to detailed descriptions of the individual landscapes, supplemented by chapters on the climate, zoology, botany, and commerce of the country. As to the future of these regions, the most critical aspect of the same is the impoverishment of its turbulent population who can no longer get their support from their soil. They are thus obliged to look for additional means of subsistence outside, which, in the past, meant mostly robbery. As this state of things cannot be allowed to last, a substitute for this source of revenue must be found, and as such the author proposes to encourage peaceful traffic between Algeria and the Sudan. For this reason, he objects to the plan of a trans-saharian railroad because it would kill what little overland traffic may be possible on this line, and to this traffic, not the speculation of a small group of his countrymen, the government ought to give every possible encouragement for the reason named above. Besides, caravan trade will, for a good many years to come, be perfectly sufficient for the commercial needs of the country, even with regard to through traffic.

The books are finely illustrated and supplied with special maps. They are in every respect a very welcome addition to the special geography of the French Sahara.

M. K. G.

AUSTRALASIA AND OCEANIA

Sir Joseph Banks: The "Father of Australia." By J. H. Maiden. 237 pp., many illustrations and map. Kegan Paul, Trench, Trübner & Co., Ltd., London, and William Applegate Gullick, Government Printer, Sydney, 1909. 6s.

Banks has long been called "The Father of Australia," but, in that continent, his name has been overshadowed by its association with that of Cook. In recent years there is a tendency more adequately to recognize his services and this appreciative work will emphasize that tendency. It is a curious fact that his drawings of the plants collected in Cook's first voyage and his descriptions of them, to which he gave great care, were not published till eighty years after his death. This book tells just what Banks added to our knowledge of the world, not only in Australia, but also in Newfoundland and Iceland, where he explored Mt. Hecla, the Geysers, and other remarkable features of the island. But it was to Australia that Banks rendered the most distinguished service, and more than half of the book is given to his contributions to the exploration and the development of that continent. First of all he was a scientific man, a botanist mainly, and prominence is given in this book to his work in botany and horticulture.

The Volcanoes of Kilauea and Mauna Loa on the Island of Hawaii. Their variously recorded History to the present Time. By William T. Brigham. vii and 222 pp., 67 plates of photographs, 101 figures in the text, index and map. Memoirs of the Bernice Pauahi Bishop Mission. Vol. ii, No. 4. Bishop Museum Press, Honolulu, 1909.

The volume is copiously illustrated with good photographs well worth preserving for the light they throw on these Hawaiian volcanoes. The author,

who began his studies nearly a half century ago, gives little space to tentative theorizing, but presents a great deal of material for the further elucidation of questions relating to the volcanoes; and he tells a connected story of their activities in historic times. His long familiarity with the visible phenomena and the written record has helped him to make a very valuable addition to the literature of Hawaiian vulcanology.

EUROPE

Ancient Britain and the Invasions of Julius Cæsar. By T. Rice Holmes. xx and 743 pp., 44 illustrations, 3 maps and addenda. Clarendon Press, Oxford, 1907. 21s.

As the title indicates, "Ancient Britain and the Invasions of Julius Cæsar," by T. Rice Holmes, does more for England than its predecessor and companion volume did for France. There the author's purpose was merely to illustrate Cæsar's narrative of the Gallic Wars, though in doing so he gathered together a vast range of material of the greatest importance to the archæology, history and antiquities of Gaul. Here, besides illustrating the far briefer narrative of the invasions, he gives an account of the life of man in Ancient Britain from the earliest pre-historic times. As in the former book, the narrative of Part I is continuous, giving the reader the garnered results of many an investigation and of much careful thinking, while Part II is devoted to more technical discussions, where many-sided problems have a full presentation.

The chapters descriptive of the state of Britain before Cæsar's first invasion give successive pictures, with an abundance of anthropological detail, of the Palæolithic, the Neolithic, the Bronze, and the early Iron Age. After affirming his belief in Tertiary man, despite the lack of remains, the author discusses the Ice Age and finds that "man was undoubtedly living in Southern Britain in the cold period that succeeded the so-called inter-glacial period." He has nothing to offer as to the date of these shadowy ages, except to suggest that the Palæolithic Age in Britain may have been partly contemporary with the Neolithic in warmer climates. Dr. Evans dates the earliest Neolithic remains in Crete about 12,000 years ago, and those at Susa, in the Euphrates valley, have been placed about 18,000 B. C. In these early days England was still continental and the Thames a tributary to the Rhine.

With the advent of the Neolithic invaders British civilization begins, and may be said to be fairly continuous from that day to this. By that time the great beasts which had lived in Britain with Palæolithic man were no more, but the Irish elk and the aurochs survived into the Bronze Age.

The beginning of the Bronze Age in Britain is set not later than 1,400 B. C., and about this time another invasion from the Netherlands, Denmark, and Gaul occurred, introducing some portion of the so-called Alpine race of Central Europe, from which came also those fair-haired heroes called Achæan, who overran the Mycenæan bronze civilization of the eastern Mediterranean lands. The picture of the life and culture of the Bronze Age is naturally more complete and lifelike than that of the preceding, and we have a full account of their social organization, agriculture, dwellings, dress, ornaments, etc., with something like the fullness with which we can trace this age in Crete and Greece.

Of especial interest at this point is the extended and sympathetic account of the voyage of Pytheas, that Greek explorer who first made Britain known to

the civilized world. Sailing from Massilia (Marseilles) about the time when Alexander was invading the Far East, this early navigator not only circum-navigated the British Isles but made careful scientific observations of the lunar influence on the tides, of the altitude of the sun at noon at points along the coast from which Hipparchus could calculate their latitude, and of the manners and customs of the inhabitants. Mr. Holmes settles upon St. Michael's Mount (not to be confounded with Mont St. Michel on the French coast) as the ancient Iotis (literally Channel island) from which the tin was shipped to the mouth of the Loire, thereby rejecting the long-accepted etymological identification with the Isle of Wight.

One is impressed anew by the reading of this book with the fact that England, instead of being the "tight little island" she imagines herself to be, has in reality ever been open to invasion after invasion; that of the Normans is but the last (up to the present) of a long series, the beginning of which antedates written history. About 400 B. C. the Brythons began to enter, from Gaul or Belgium, bringing with them the Celtic language and the use of iron, which by this time had spread over continental Europe. Of their civilization we have even a fuller picture, towns permanently inhabited, currency, operations of mining, works of art, reading and writing, and the Druidical system of religion.

Such they were when Cæsar reached them, Aug. 26 (according to Mr. Holmes not Aug. 27), 55 B. C. Where did he land and whence did he set sail? These vexed questions are treated at great length in special excursions of Part II. Unfortunately for our peace of mind, Mr. Holmes himself in his still more recently published translation of Cæsar's text, changes front again and leaves the question of embarkation still open, despite the fact that in the preface to this book he regards it as settled forever and is inclined to regard with pity those crooked minds that refuse to be convinced by his invincible arguments. "The questions would have been settled long ago if any competent writer had bestowed upon them as much care as has been expended in investigating Hannibal's passage over the Alps." It is well known that the location of the Portus Itius (literally Channel port) from which Cæsar sailed has had as many claimants as Homer's birth-city and with about as fair a chance of amicable adjustment. As early as the Fifteenth Century, Raymond de Marliano identified it with Calais, but of late the choice has been restricted to Wissant and Boulogne. So excellent are the reasons which Mr. Holmes adduces for his selection of Boulogne that, were it not for his still more recent change, we might reasonably regard the inquiry as closed.

Equally insoluble has been the question of his landing-place, so said Mommesen, Tozer, and Kiepert. But our author is very sure that all is plain; at least he has not yet had occasion to change. After discussing most carefully the evidence for Pevensey, Lympne (Romney Marsh), and Deal, he decides for the latter, finding that all conditions of wind, tide, and coast configuration are met by assuming the landing to have occurred on the open coast between Walmer and Deal in East Kent.

Other valuable notes follow on "Where did Cæsar first encounter the Britons on the morning after his second landing?" "Where did Cæsar cross the Thames?" "The Site of Cassivellaunus's Stronghold," "Did *Londinium* exist in Cæsar's Time," etc.

Besides many illustrations of pre-historic implements, three excellent maps are included in the volume, and the whole work is carefully indexed. S. A. H.

Studien über Nordostdeutsche Inlanddünen. Von Prof. Dr. Friederich Solger. 89 pp., 4 plates and 11 illustrations in the text. J. Engelhorn, Stuttgart, 1910. M. 5.60.

This interesting paper gives a thorough discussion of the sand dunes of northeast Germany as to their forms and distribution, age, development, the various sands and other materials of which they are composed, the winds and other influences such as the land forms that create and shape them, etc.

Esquisse de la Géographie botanique de la Belgique. Par Jean Massart. Avec une annexe contenant deux cent seize phototypies simples, deux cent quarante-six Phototypies stéréoscopiques, neuf cartes et deux diagrammes. xi and 332 pp. Extrait du *Recueil* de l'Institut botanique Léo Errera, tome supplémentaire VIIbis. Henri Lamertin, Bruxelles, 1910.

Chapters are given to the methods and purposes of geographical botany, the geological history of the Belgian soil, the climate of the country, and the principal types of vegetable associations. The forests, prairies and cultivated lands are next discussed and the geo-botanical districts are described. The accompanying plates are of the highest order of excellence and reveal clearly many typical areas of Belgium in their physiographical and botanical relations.

West-Masuren. Eine bevölkerungsstatistische Untersuchung. Von Dr. phil. Curt Kob. Mit 2 Karten und Tabellen, vi and 52 pp. Verlag von R. Trenkel. Berlin, 1908. M. 3.

A comprehensive treatment of a large part of Masuren land in East Prussia, on the border of Poland. The work especially relates to the distribution of its settlements and to the inhabitants.

Bohemia and the Čechs. The History, People, Institutions, and the Geography of the Kingdom, together with accounts of Moravia and Silesia. By Will S. Monroe. xxiv and 456 pp., 57 illustrations, map, and appendix. L. C. Page & Co., Boston, 1910. \$3.

A solid book well worth writing. Strangely enough, it is the first general work of travel and description relating to Bohemia that has appeared in English. For twenty years Mr. Monroe's studies have largely related to people, institutions, arts and development of Bohemia. In the present work he writes interestingly of the nation, the physical features of their country, their history and advance in the arts and sciences. The book is to be recommended to all who may wish to read an excellent account of the Bohemians and their environment.

Griechen und Bulgaren im neunzehnten und zwanzigsten Jahrhundert. Von Prof. Neokles Kasasis, President des griechischen Nationalvereins "Hellenismos." Autorisierte Übersetzung. 139 pp. Bernh. Liebisch, Leipzig, 1908. M. 2.

Describes the persecutions and cruelties of which the Greek population of East Rumelia and Bulgaria have been the victims. A large part of the contents was first published in English, in the form of open letters addressed to Sir Charles Dilke, M.P., later translated into French and now appears in a German edition.

Der Kanal von Calamotta. 44 pp. and 12 plates. Druck und Verlag von Heinr. Mercy Sohn, Prague, 1910.

The Calamotta Channel is one of the many channels along the Adriatic coast between Fiume and Ragussa. The description of the channel is geographically excellent and the photo-engravings are superb. Like other books issued under the patronage of Prince Ludwig Salvator, no expense has been spared in making this large octavo a sumptuous example of book work.

La Catastrofe Sismica Calabro Messinese (28 Dicembre, 1908.)

By Mario Baratta. xv and 426 pp., thirty plates of engravings, other illustrations and appendix. With volume of maps, diagrams, etc. Presso La Societa Geografica Italiana, Rome, 1910.

This record of the earthquake of Dec. 28, 1908, in Southern Italy and Sicily, issued by the Italian Geographical Society, will stand as an authoritative history and an adequate description and discussion of that catastrophe. The work is divided into four parts, dealing with (1) observations upon the regions affected, (2) the place of origin, nature and effects of the shocks, (3) earthquake sea waves and their effects along the coasts and (4) comparisons with other great Calabrian earthquakes and conclusions.

I danni prodotti dai terremoti nella Basilicata e nelle Calabrie.

Prof. G. Mercalli. Estratto dalla Relazione della Sotto Ginnta parlamentare d'inchiesta sulla condizioni dei contadini nelle provincie meridionali e nella Sicilia. Vol. V—Tomo III, *Basilicata e Calabria*. 17 pp. Tipografia Nazionale di G. Bertero E. C., Roma, 1910.

Contains lists of earthquakes that have been recorded as occurring in Basilicata (Province of Potenza) and in Calabria. Data concerning many of these earthquakes are briefly given.

POLAR

British Antarctic Expedition, 1907-'09. Under the command of Sir E. H.

Shackleton, C.V.O. Reports of the scientific investigations. Vol. I, Biology. Editor, James Murray. Parts i to iv. 79 pp., 13 plates and figures in the text. William Heinemann, London, 1910. 12s. 6d.

Mr. Murray contributes papers, Parts I-III, "Collecting at Cape Royds," "Microscopic Life at Cape Royds," "Antarctic *Rotifera*"; and Mr. Jules Cardot supplies Part IV, "*Musci*." There are five lakes in the neighborhood of Cape Royds, in which dredging yielded important results, though the bay near which the explorers were in camp was their customary dredging ground. The collecting that could be done on land was of small importance. The most prolific source of fresh-water life was a plant found embedded in the ice of nearly all the lakes. Microscopic life swarmed on this weed, and thus multitudes of living things for study were obtained.

In the sea dredging carried on chiefly in the bay, the bottom seemed to be covered by a carpet of living things, including sponges, sea-spiders, lace-corals, holothurians, file-shells, star-fish and many others. Very little plankton collecting could be done in McMurdo Sound. It was somewhat of a surprise to find an abundant microscopic fauna and flora at Cape Royds. These animals are not at all troubled by the rigors of the climate. "When the cold comes they curl up and go to sleep, it may be for years, and when the thaw occurs they go mer-

rily on as though nothing had happened." Among the higher invertebrata the rotifers are easily first in number, both of individuals and species. A preliminary account is given of the microscopic life.

Mr. Murray says of the distribution of *Rotifera*:

"The *Rotifera* share with the lowest forms of life that facility for distribution which makes them, as Jennings puts it, "potentially cosmopolitan." The agent of distribution is the wind. When some rotifers and the eggs of others are dried they may be blown in the form of dust for long distances. There is no difficulty in supposing the Antarctic peopled in this way, though there is no region where such distances of sea must be crossed in the process; but all round the Antarctic continent the storm-winds generally blow off the land, and so could play no part in bringing a rotifer population to the country."

National Antarctic Expedition, 1901-1904. Meteorology, Part I. Observations at Winter Quarters and on Sledge Journeys, with Discussions by various authors. Prepared under the superintendence of W. N. Shaw, the Director of the Meteorological Office, with the co-operation of a committee of the Royal Society. The Royal Society, London, 1903.

Contains the chief part of the results of the meteorological observations made in connection with the voyage of the *Discovery* of the British National Antarctic Expedition, under command of Capt. R. F. Scott, R. N., 1901-1904. The data of the observations at winter quarters and on the sledge journeys fill a large part of the volume (pp. 17-364) and are accompanied by the maps of Lieut. Mulock, made for the Royal Geographical Society to illustrate the geographical positions. Tables of results for other expeditions are given for the purpose of comparison. A number of papers based upon the observations are included in the volume, among which are: "Climatology of South Victoria Land and the Neighboring Seas," by Capt. Campbell Hepworth; "Notes on the Observations of Temperature at the Winter Quarters of the *Discovery*"; and "Notes on the Observations of Barometric Pressure," by R. H. Curtis.

Rapport sur l'Expédition Polaire Néerlandaise qui a Hiverné dans la mer de Kara en 1882-83. Commencé par M. Snellen, et fini par H. Exama. J. Van Boekhoven, Utrecht, 1910.

This expedition was one of those sent out to establish the international, circumpolar stations in the Arctic for the purpose of taking simultaneous meteorological and magnetic observations on all sides of the North Polar area. The Dutch expedition had the misfortune to lose its vessel, which was crushed in the ice of the Kara Sea. The calamity did not, however, defeat the scientific purposes for which the party was sent North, and it was able to make continuous meteorological observations from August, 1882, to July, 1883. An account of the expedition appeared years ago in Dutch; and it will be gratifying to all who sympathized with these brave men in their misfortunes to learn that they at last secured the funds needed to produce this well-printed and finely illustrated account of their expedition and of its scientific results.

ECONOMIC GEOGRAPHY

The Story of Oil. By Walter Sheldon Tower. xii and 271 pp. and illustrations. D. Appleton & Co., New York, 1909. \$1.

Within recent years a number of American writers have rendered valuable service by enriching the voluminous literature dealing with the world's most im-

portant industries. The peculiar nature of this service has consisted in the preparation of concise, readable volumes, in each of which an attempt has been made to give a sort of bird's-eye view of the entire history of some important material of commerce. The author of the present book has undertaken to develop the story of petroleum in non-technical language, with the two-fold purpose of portraying the great expansion of the industry within the last half-century, and of pointing out the marked dependence of the masses in their daily life, upon petroleum and its secondary products. It is not too much to say that he has succeeded admirably in the execution of his task.

In the earlier chapters the writer discusses the ancient history of petroleum, its real nature, its geographical distribution, and the much disputed question of its origin. He then proceeds to a consideration of the evolution of the petroleum industry, pointing out that, in general, production has been marked by three distinct steps—the skimming of the oil from the surfaces of streams, pools or springs; the digging of wells or pits; and, finally, the well-known modern method of drilling wells. The important part which the United States has played in the oil industry necessitated the writer giving considerable attention to its evolution in this country. However, our principal rival—Russia—receives due consideration, while other well-known but less worked deposits by no means are overlooked.

The sections which treat of the marvellous transformations which have been brought about in the transportation of petroleum, and of the wonderful growth of the oil industry in recent times are particularly interesting and instructive. In conclusion, the author predicts the eventual decline of our oil business. "Not the present generation nor the one next to come is likely to see the supply fail, but both are sure to see changes such as the industry has never shown before. With a continuation of the present conditions no power on earth can avert the speedy exhaustion of the fields in this country. Standard Oil will be a thing of the past, and America will have to seek her oil in the countries where she long held undisputed sway in the oil trade."

The book is written in a pleasing style, and contains upwards of thirty illustrations. Not only is it of interest to the general reader, but it cannot fail also to be of value to teachers and students in courses in commercial or economic geography.

A. L. BISHOP,

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Exploitation de Pétrole. I Historique—Extraction—Procédés de Sondage—Géographie et Géologie, Recherches des Gîtes—Exploitation des gisements chimie—Théories de la Formation du Pétrole. Par L. C. Tassart. xv and 726 pp., 302 figures in the text and maps. II. Dunod and E. Pinat, Paris, 1908. Fr. 35.

An authoritative work on petroleum and the products and industries to which it gives rise. It treats in detail of petroleum fields in all parts of the world and its information is practically complete up to the time of publication. It contains, for example, a full account of the recent development of the oil industry in Illinois, and of the large increase in the productivity of Texas; but it lacks, of course, the latest information on the growth of the industry in California. Though a scientific work, most of it can be read with interest and profit by the general public. We do not always see a work so fully treating the technology of a subject that, at the same time, is so well adapted for general reading. The numerous maps illumine the text.

Oil Fields of the Empire. A Survey of British Imperial Petroleum Questions and a comprehensive technical Description of the Oil Fields of Trinidad and Newfoundland. By J. D. Henry. Prefatory Notes by Mr. W. H. Macgarvey, Sir Edward Morris, Mr. R. H. McCarthy, Prof. Zuber and others. xxix and 263 pp., 28 illustrations, 10 maps, diagrams, and appendices. Bradbury, Agnew & Co., Ltd, London, 1910. 18s.

Mr. Henry, a petroleum expert, the founder of the *Petroleum World*, and author of several works on the industry, gives in this book a survey of oil development and a technical description of the oil fields of Trinidad and Newfoundland. He reserves for future writing the oil fields of Barbados, New Zealand and other centers in the British Empire. The present book, therefore, does not quite do justice to the comprehensive title. Two hundred and ten pages are given to every phase of oil production in Trinidad and sixty-eight pages to the oil regions on the west coast of Newfoundland, this being the first published history of the oil districts on that island. The author predicts that Newfoundland will take a leading position. The work has special value as a history of a part of oil development and will be an essential source of data for all who are interested in oil enterprises in the British Empire.

The Story of Sugar. By George Thomas Surface, Ph.D., M.Sc. xvi and 216 pp., 34 illustrations. D. Appleton & Co., New York, 1910. \$1.

A painstaking study of the sugar industry, to which the author gave many months in field investigations and the collection of data. The book opens with a chapter on the occurrence of sugar in nature, followed by chapters on the early history of sugar, sugar as a food, etc. The controlling factors in the raising of sugar cane are discussed. The production of cane sugar is described in all countries, with special emphasis on the industry in the United States. The production of beet sugar is then treated and the six concluding chapters are given to the various sugar manufactures and the trade in the commodity. Sugar in all its phases has been very thoroughly treated by authoritative writers in Germany and the Netherlands, but little has been written on the subject in English, excepting in a technical and commercial sense. Both as a text-book and a work for general reading this careful and excellent study will be found very useful.

Der Getreidebau im deutschen und römischen Altertum. Beiträge zur Verbreitungsgeschichte der Kulturgewächse. Von Robert Gradmann. III pp. Hermann Costenoble, Jena, 1909. M. 3.

The history of the distribution of cereals in ancient times has been given in some detail by various writers, notably by Dinkel and Emer. In recent years a number of students have examined this subject, more or less thoroughly. In this book Dr. Gradmann brings together the fruits of his own published studies and those of other writers, with regard to the distribution and the uses of the grains in early German and Roman times. Much of this material is not easily accessible, and it is convenient to have it thus collated in one volume.

EDUCATIONAL

La France et ses Colonies. Par MM. Henri Busson, Joseph Fèvre, Henri Hauser. Avec 73 gravures et 88 cartes dans le texte, 649 pp. Felix Alcan, Éditeur, Paris, 1910. 3.50 Fr.

One of the new French text-books of geography. It gives a systematic

account of France and her colonies, in which especial attention is given to commerce and industries. At the end of each chapter is a bibliography of works relating to its topic. The black maps and diagrams are effective.

The Oxford Geographies, Vol. III. *The Senior Geography*. By A. J. Herbertson, M.A., Ph.D., and F. D. Herbertson, B.A. 363 pp. and illustrations. Clarendon Press, Oxford, 1909. 2s. 6d.

The third volume of Dr. Herbertson's new geographical series. The first volume, largely descriptive, gives definite pictures of different parts of the globe and outlines its leading topographic features. The second book emphasizes the interrelation between configuration, climate, vegetation and human activities. The third or Senior volume is devoted to the consideration of the world according to its natural regions. The black maps and diagrams, mainly illustrating topographic types and physical divisions of the continents, are excellent. An accompanying pamphlet contains questions on the contents of the book and a statistical appendix.

Travellers' Practical Manual of Conversation, in four Languages, English, French, German and Italian. Prepared by E. Marlborough & Co. 114 pp. E. Marlborough & Co., London, 1909. 1s. 6d.

Hungarian Self-Taught. Thimm's System, With Phonetic Pronunciation. By The Count de Soissons. 112 pp. E. Marlborough & Co., London, 1910. 2s. 6d.

Finnish Self-Taught. Thimm's System, with Phonetic Pronunciation, By Agnes Renfors. 120 pp. E. Marlborough & Co., London, 1910. 2s. 6d.

The first of these manuals is intended to facilitate the travels of English-speaking travelers in France, Germany and Italy. The other volumes are new works added to the long list of manuals published by this firm to help the student to get a working knowledge of various languages.

L'enseignement aux indigènes. 9e Série Tome II—Colonies française (*suite*): Madagascar.—Indo-China—Colonies britanniques. 750 pp. Institut Colonial International, Brussels, 1910.

The task which the International Colonial Institute assumed of collecting and publishing complete data, with regard to the methods and extent of instruction given to the natives of the Colonies is now nearing completion. An enormous mass of information has been published in these large volumes. The chapters on each colony are opened with an historical account of the progress of education, and followed by official documents showing the nature of the education given and the governmental control of the work.

GENERAL

The Recognition of Minerals. Being a Collection of Notes and simple Tests for the Use of Travellers and Prospectors. By C. G. Moor, M.A. With Monographs on Geology, Ore Deposits, etc., by Donald A. McAlister. vii and 231 pp. and index. *The Mining Journal*, London, 1910?. 7s. 6d.

This work is essentially a collection of notes for the use of prospectors and others of little technical training. The avowed object of the publication is to assist the untrained observer in distinguishing "minerals of commercial value

from ordinary rocks and stones." It is evidently the conviction of the author that many people are enough interested in minerals to study them, but who find the usual text book either too elaborate or too limited in scope to meet their needs. In this he is probably right, and most trained mineralogists would concede this point. On the other hand, no book can be expected wholly to take the place of a laboratory training, of some experience with minerals themselves, and of a little guidance from a competent instructor. The standards of tests and characters are all difficult to fix from descriptions alone. The best that can be hoped for is that fewer and less glaring blunders will be made if some simple guide is carefully followed.

Mr. Moor's book contains a varied lot of sound information, which, if mastered, would tend to more correct identifications and interpretations than the untrained collector would otherwise reach. There are sections on prospecting, on rock classification, on ore deposits, non-metalliferous deposits, the conditions under which mineral deposits occur, and on mining and processes of handling and treating ores. The greater part of the book, however, is devoted to the recognition of minerals and to a descriptive list of the metals and non-metals, giving their occurrence and mineral representatives with a few suggestions of methods of testing.

The physical appearance, such as luster and color, is made the basis of preliminary grouping. Probably this color grouping is as serviceable as any that could be devised for the intended use, although it has the disadvantage of throwing many very unlike minerals together, after which the succession of mineral descriptions is relied upon for further identification. One cannot help wishing that the physical character basis of subdivision had been carried a step further in order to simplify the process. Many of the descriptions are too brief and seem inadequate for such use. This is especially noticeable in the cases of some of the commonest and most abundant minerals. Such minerals as hornblende and augite and olivine are not listed at all in the determinative scheme. The feldspars are so briefly described that it is doubtful whether any untrained observer would identify them by these methods. An identification scheme ought to be more complete.

The book will be found useful. It contains a more varied lot of information than is usually included in a single volume on minerals, and the matter is presented in a style well suited to its purpose.

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Bibliotheca Geographica. Jahresbibliographie der gesamten Geographischen Literatur. Herausgegeben von der Gesellschaft für Erdkunde zu Berlin. Bearbeitet von Otto Baschin. Band XV, Jahrgang 1906. xvi and 535 pp. and index to authors. W. H. Köhl, Berlin, 1910.

Dr. Baschin continues to render good service to geographers by the annual issue of this work, which involves enormous labor. We get a vivid idea of the great literary productivity in the geographical field, when we examine this large book in small type devoted to the titles of books, papers and maps. The methodical classification of material and the index to authors make it convenient to find any publication of geographical value relating to any part of the world or produced by any competent geographical writer.

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NEW MAPS

NORTH AMERICA

U. S. GEOLOGICAL SURVEY MAPS

ALASKA. (a). Topographic Maps of Solomon and Casadepaga Quadrangles. 2 colors; (b). Geologic Maps of Solomon and Casadepaga Quadrangles. 6 colors. Both in 1:625,000 = 9.88 miles to an inch. Illustrate "Geology and Mineral Resources of the Solomon and Casadepaga Quadrangles, Seward Peninsula, Alaska," by Philip S. Smith. *Bull.* 433, 1911, U. S. Geol. Surv., Wash.

CALIFORNIA. Southern California. Sheet 3. 1:250,000 = 3.95 miles to an inch. Topographic Survey. Contour interval, 250 feet. 4 colors. U. S. Geol. Surv., 1910, Washington.

COLORADO AND UTAH. N. W. Colorado and N. E. Utah. (a). Recon. Geol. and Topogr. Map of Part of Rangely Quadr., Col. 18 symbols in colors; (b). Recon. Geol. and Topogr. Map of part of Jensen Quadrangle, Utah and Col., etc. 14 symbols in colors; (c). Recon. Geol. and Topogr. Map of Part of White River Quadr., Col. 16 symbols in colors; (d). Recon. Geol. and Topogr. Map of part of Grand Hogback Quadr., Col. 16 symbols in colors; (e). Recon. Geol. and Topogr. Maps of Part of Danforth Hills Quadr. Col., including adjacent portion of Lay Quadrangle. 24 symbols in colors. All, on scale of 1:125,000 = 1.94 mile to an inch. Illustrate "Coal Fields of North-western Colorado and Northeastern Utah," by Hoyt S. Gale. *Bull.* 415, 1910, U. S. Geol. Surv., Washington.

INDIANA. Map of North Central Indiana, Showing Artesian Well Areas. 1:625,000 = 9.88 miles to an inch. 2 colors. Illustrates "The Underground Waters of North-Central Indiana," by Stephen Capps, in *Wat. Supp. Pap.* 254, Washington, 1910.

NEW MEXICO. Map of New Mexico, showing locations and names of metal mining districts. 1:2,500,000 = 39.46 miles to an inch. Two colors. Illustrates Prof. Paper 68 "The Ore Deposits of New Mexico" by W. Lindgren and others. Washington, 1910.

NEW MEXICO AND N. ARIZONA. Geologic Map of Part of Northwestern New Mexico and Northern Arizona. By N. H. Darton. 1:1,000,000 = 15.78 miles to an inch. Contour interval, 1,000 feet. Illustrates "A Reconnaissance of parts of N. W. New Mexico and N. Arizona," same author. *Bull.* 435, 1910, U. S. Geol. Surv., Wash. [Base compiled mainly from topogr. sheets of the Survey. Twenty-one colored symbols show geological formations.]

U. S. COAST AND GEODETIC SURVEY CHARTS

United States. Arctic Coast of Alaska. No. 9,400; Boston Harbor. 337. 1:40,000; Boston Inner Harbor. 248. 1:10,000; Charleston Harbor. 431. 1:30,000; Chesapeake Bay Entrance. 131. 1:80,000; East Penobscot Bay. 309. 1:40,000; Galveston Bay. 204. 1:60,000; Galveston Entrance. 520. 1:40,000;

Plum Island to Stratford Shoal. 115. 1:80,000; Provincetown Harbor. 341. 1:50,000; Rappahannock River Entrance. 534. 1:40,000; Savannah to Sapelo Island. 156. 1:80,000; Siuslaw River. 6023. 1:20,000; Vineyard Sound and Buzzards Bay. 112. 1:80,000; Wells to Cape Ann. 108. 1:80,000.

Philippine Islands. Cebu Harbor. 4447. 1:30,000; Southwestern Luzon and Mindoro. 4714; Passages between Luzon and Masbate. 4219. 1:100,000; Manila Bay. 4255. 1:125,000; Southern Part of Samar. 4423. 1:100,000; Western Bohol. 4429. 1:100,000.

Panama. Panama Road. 951. 1:25,000; Colon Harbor. 950. 1:15,000.

U. S. HYDROGRAPHIC OFFICE CHARTS

Pilot Charts of the North Atlantic Ocean, Dec., 1910, Jan. and Feb. 1911.

Pilot Chart of the North Pacific Ocean, Feb., March, 1911.

Pilot Chart of the South Atlantic Ocean, March, April, and May, 1911.

Pilot Chart of the South Pacific Ocean, March, April and May, 1911.

U. S. WEATHER BUREAU CHARTS

Meteorological Chart of the Indian Ocean. March, 1911.

Meteorological Chart of the Great Lakes. March, 1911.

Meteorological Chart of the North Atlantic Ocean, March, 1911.

Meteorological Chart of the North Pacific Ocean, March, 1911.

Meteorological Chart of the South Atlantic Ocean, March-April-May, 1911.

Meteorological Chart of the South Pacific Ocean, March-April-May, 1911.

U. S. DEPT. OF AGRICULTURAL MAPS

UNITED STATES. Soil Survey maps of the Nashua area, N. H.; Conway area, S. C.; Grayson Co., Tex.; 1:63,360 and 1:62,500. [In colors, with contours of elevation and descriptive text.]

SMITHSONIAN INSTITUTION MAPS

MISSOURI. Archæological Sites in Missouri. By Gerard Fowke, 1906-07. 1 inch = 18 miles. Black. Illustrates "Antiquities of Central and South-Eastern Missouri," same author. *Bull.* 37, 1910, Bur. of Amer. Ethn., Smiths. Inst., Washington.

NEW MEXICO. Map of New Mexico. 1 inch = 20 miles. 4 colors. In *Contr.* U. S. Nat. Herbarium, Vol. 13, Part 6, 1910, Smiths. Inst., Wash. [Shows forest, Indian, and military Reserves and type localities of plants first described from New Mexico.]

ALASKA. Map of part of Alaska. 1 inch = 150 miles Black. Illustrates. *Bull.* of the Geol. Soc. of Amer., New York, 1910. By Lawrence Martin.

WASHINGTON. Map of the State of Washington. Showing location of irrigated and irrigable lands. 1 inch = 21 miles. 3 colors. Illustrates "The Irrigated Lands of Washington" by Geo. M. Allen, issued by the State Bureau of Statistics and Immigration, Olympia, Wash., 1910. [Green symbols show irrigated and irrigable lands.]

WASHINGTON. Geologic Map of Republic District. By J. B. Umpleby, 1 inch = $\frac{1}{2}$ mile to an inch. 6 colors. Illustrates "Geology and Ore Deposits of Republic Mining Districts," *Bull.* No. 1, 1910. Same author. *Geol. Surv.*, Olympia, Wash.

CANADA-UNITED STATES. (a) Hydrography of the Thousand Islands region. No scale. 2 colors. [Shows the preglacial divide between waters now crossed by the diverted Black river. Also present divide between St. Lawrence and Black rivers]; (b) 4 sheets showing geology of Clayton, Grindstone, Theresa and Alexandria Bay Quadrangles. 1:62,500 = 0.9 mile to an inch. [Colors for geological formations.] Illustrate "Geology of the Thousand Islands Region" N. Y. State Museum, *Bull.* 145, 1910, Albany.

CANADA. Map of the South-Western part of British Columbia. 1 inch = 12 miles. 2 colors. Dept. of Lands, Victoria, B. C. [Covers British Columbia W. of the 120th meridian and S. of the 52nd parallel. Large nomenclature and detailed drainage but no delineation of surface forms.]

CANADA. (a) Cereal Map of Manitoba, Saskatchewan and Alberta, showing acreage under crop (1909) in each township in wheat, oats, barley and flax. 3 sheets. One inch = 12.5 miles. 3 colors; (b) Map showing Elevators of Manitoba, Saskatchewan and Alberta. One inch = 25 miles. Dept. of Interior, Ottawa, 1910. [Circles on Map A, in each township, drawn to scale, denote the area under each grain. The colors of the circles show the variety of grain. Map B gives the total elevator capacity at each R.R. station, each railroad system having its own color. The maps are supplemented by statistical tables. It is intended to issue new editions for each year.]

MEXICO. Carta de la región abarcada por el temblor del 26 de Marzo de 1908, formada en el Observatorio Meteorológico Central de México. Por el Sr. Juan F. Romani, bajo la dirección del Sr. Ing. Manuel E. Pastrana. 1:9,000,000 = 142 miles to an inch. Black. With "Los Terremotos del año de 1908," por Manuel Miranda y Marrión, M. S. A., in *Memorias Y Revista*, de la Soc. Cient. "Antonio Alzate" Tome 28, Nos. 1-4, 1909, Mexico City, [Shows extent of area affected by earthquakes with regions of maximum and lesser intensities.]

SOUTH AMERICA

CHILE. Republica de Chile. 3 Maps. 1909, 1910. 1:500,000 = 7.89 miles to an inch. 4 colors. Oficina de Mensura de Tierras. Santiago, 1910. [Sheets of a good map of Chile that is being produced under the supervision of Luis Riso Patron S, the Director of the Land Office Surveys. Elevations are shown by deepening tints of brown. The drainage is in blue, rail and other roads are shown, large nomenclature, and elevations in meters. The completion of this work will be welcome, for it is the most authoritative map of the Republic yet produced. The sheets include statistical tables.]

AFRICA

AFRICA. Map of Africa [in Arabic]. 4 colors. Gouvernement Général de l'Algerie. Algiers, 1910. [A small wall map intended for Arabic schools in Algeria. Main features of hydrography are in blue and boundaries of colonies and countries in black. The French colonies are in light red; others white.]

BELGIAN CONGO. (a) Übersichtskarte des Gebites zwischen Kongo und Ubangi. 1:3,000,000 = 47.34 miles to an inch. Von F. R. Thonner. 5 colors. [Shows the explorer's routes, political boundaries, government posts, mission stations and southern boundary of the grass lands;] (b) Sprachenkarte des Gebietes zwischen Kongo und Ubangi. 1:3,000,000. Von F. R. Thonner. 11 tints. [Shows the boundaries of seven groups of natives speaking Sudanese and four groups speaking Bantu languages, also the southern boundary of the beehive hut, the gable roof type prevailing further south.] (c) Franz Thonner's Aufnahmen zwischen dem Kongo und dem Ubangi, Jan.-Feb., 1909. 1:500,000 = 7.89 miles to an inch. 4 colors. [The physiography along the author's routes is mapped in considerable detail.] Illustrate "Vom Kongo zum Ubangi" by F. R. Thonner. Dietrich Reimer, (Ernst Vohsen) Berlin, 1910.

GERMAN EAST AFRICA. Das Massai-Reservat südlich des Kilimandscharo. 1:200,000 = 3.14 miles to an inch. 5 colors. *Mitt.* aus den Deutschen Schutzgeb. 23. Band, 3. Heft, Berlin, 1910. [Numbered symbols show the positions of the most important water sources in the Masai Steppe with descriptive text for each in the margin. Topographic forms along the routes followed are indicated by brown contours. This informing map is based upon the astronomical place determinations of Prof. Dr. Kohlschütter, triangulation points observed by Prof. Dr. Uhlig, and the surveys of Majors von Prittwitz and Gaffron July-Dec. 1906.]

GERMAN SOUTHWEST AFRICA. Karte der Tiras Hochfläche. 1:100,000 = 1.57 mile to an inch. 2 colors. Illustrates "Die Tirashochfläche," by Dr. Eduard Moritz, in *Mitt.* Deuts. Schutzgeb., 23 Bd., 5. Heft, 1910, Berlin. [Shows railroad, wells, etc., and indicates, in brown, the dry and other watercourses.]

SOUTH AFRICA. (a) Sheet 6—Mafeking. Portion of Marico and Lichtenburg Districts. 1 inch = 4 miles. 5 colors; (b) Sheet 5—Zeerust. Portions of

Marico, Rustenburg, and Lichtenburg Districts. 1 inch = 4 miles. 4 colors. Transvaal Mines Dept., Geol. Surv., 1910. [Colored symbols for geological formations with geological profiles on margin.]

ASIA

BORNEO. Part of North East Borneo. 1:250,000 = 3.94 miles to an inch. 2 colors. Illustrates "Some Contributions to the Physiography and Hydrography of North-East Borneo. By I. A. Stigand, *Geogr. Journ.*, Vol. xxxvii, No. 1, 1911, London.

CHINA. Postal Map of China. No scale. 4 colors. Illustrates "Report of the Working of the Imperial Post Office." Part 1 (B). Returns of Trade and Trade Reports for 1909. China Imperial Maritime Customs, Stat. Series, Nos. 3 and 4. Shanghai, 1910.

CHINA. Sketch plan of Coast Line with Canton and West River deltas, to irrigate junk trade with Hongkong 1 inch = 11 miles. Black. China Imperial Maritime Customs, Stat. Series, Nos. 3 and 4. Shanghai, 1910.

DUTCH EAST INDIES. Stand van het Kaarteeringswerk in den Nederlandsch O. I. Archipel. 1:6,000,000 = 94.6 miles to an inch. 3 colors. Inset: Stand van de Landrente-Metingen op Java en Madoera. 1:3,500,000 = 55.24 miles to an inch. 3 colors. Jaarverslag van den Topogra. Dienst in Nederl.-Indie, over 1909. Vijfde Jaarg., 1910, Batavia, [shows the areas of reconnaissance and trigonometrical surveys and astronomical positions fixed].

DUTCH EAST INDIES. Het Ranau-Meer (Zuid Sumatra). 1:50,000 = 0.79 mile to an inch. 3 colors. Illustrates "De Topographische Opneming van Zuid-Sumatra." Jaarverslag van den Topogr. Dienst in Nederlandsch-Indie over 1909. Fijfde Jaarg., 1910. Batavia.

DUTCH EAST INDIES. Aanvullings en Verbeterblad van Zuid-Neuw-Guinea. 1:1,000,000 = 15.78 miles to an inch. 2 colors. Illustrates "Vluchtige Opnemingen" in Jaarverslag van den Topogr. Dienst in Nederlandsch-Indie over 1909. Fijfde Jaarg., 1910. Batavia. [Results of a reconnaissance survey between 138°-141° E. Long. and 5°-7° 30' S. Lat.]

INDIA. (a) India Showing stations of Observation of the Magnetic Survey. 1:6,082,560 = 96 miles to an inch; (b) India Showing the Progress of Forest Survey. 1 inch = 128 miles. 4 colors. *Gen. Rep't.* on the Operations of the Surv. of India. 1908-09. Calcutta, 1910.

INDIA. Karakoram Himalayas. Upper Basin of the Baltoro Glacier, the Godwin Austen Glacier and their tributaries. 1:125,000 = 1.97 miles to an inch. 3 colors. Illustrates "The Expedition of H. R. H. the Duke of the Abruzzi to the Karakoram Himalayas," by Dr. Filippo de Filippi. *Geogr. Journ.*, Vol. xxxvii, No. 1, London, Jan., 1911. [Comprises the upper basin of the Baltoro glacier, the Godwin Austen glacier with its tributaries, which encircle three-fourths of the mountain K2 and the mountain chains which enclose them. The configuration of the district differs widely from that given in the map of the Anglo-Austro-Swiss expedition, published by Dr. J. J. Guilhaumod. The height of Broad Peak is given as 27,133 feet. This altitude and that of Teram Tangri (27,710 ft.), at the head of the Siachen glacier, brings up to seven the number of mountains now known to be over 27,000 ft. high. The other five are Mt. Everest, K2, the two peaks of Kanchenjunga, and Makalu.]

PERSIA. North-East Persia. 1:1,500,000 = 23.67 miles to an inch. 3 colors. Illustrates "A Sixth Journey in Persia." By Major P. M. Sykes, in *Geogr. Journ.*, Vol. xxxvii, No. 1, London, Jan., 1911.

WESTERN ASIA. Map of Eastern Turkey in Asia, Syria and Western Persia. 1:2,000,000 = 31.56 miles to an inch. 7 colors. Royal Geogr. Soc., London, 1910. [An excellent map of this region, including Mesopotamia where the new Turkish Government, under the advice of Sir William Willcocks, has drawn up schemes for restoring the ancient irrigation works. The names of the Assyrian and Babylonian epochs are used on the map because its limits correspond with the area of those former Empires.]

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AN EXTENSION OF THE KNOWN AREA OF
PLEISTOCENE GLACIATION TO THE
COAST RANGES OF CALIFORNIA

BY

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By recent usage the application of the term, Coast Ranges of California, is limited to the series of roughly parallel ridges lying west of the great central valley of the state and extending from the Klamath Mountains on the northwest to the Mt. Pinos group situated southward of the extreme upper end of the San Joaquin valley. This complex of mountains around Mt. Pinos may be considered as formed by the meeting of the Coast Ranges, the Sierra Nevada, and the Sierra Madre of southern California. Without further qualification, the term Coast Ranges will be used in this restricted sense in the following paper.

On maps showing the extent of Pleistocene glaciation in North America, the only portions of California commonly included are Mt. Shasta and the higher slopes of the Sierra Nevada. During the past ten years, largely through the work of Diller* and of Hershey,† it has become known that the Klamath mountains were rather extensively glaciated and that the lower limit of the ice was probably below that in the Northern Sierra. This region is shown on a map in the third volume of Chamberlain and Salisbury's "Geology" and since the publication of that work, Fairbanks and Carey‡ have added an area in Southern California by finding indications of glaciation in the San Bernardino Mountains. But hitherto it has been tacitly

*Bull. 196, U. S. G. S., p. 58.

†*Jour. Geol.* VIII, 1900, p. 42.

‡*Science*, 31, 1910, p. 32.

assumed that the Coast Ranges never have been subject to glaciation. This assumption has been made, apparently on the ground of their lesser elevation compared to the Sierra Nevada and without due consideration of other factors than elevation as causes of local glaciation. In studying the physiography of California, the writer has been impressed with the relatively heavy precipitation in the mountains of the Coast Province and also with the unappreciated height of many of the ranges. The further fact that the higher mountain tops in these regions at present carry snow until late in summer led to a determination to make a search for evidences of local glaciation.

The range selected for the first exploration forms the steep western rim of the upper Sacramento valley. It extends approximately north and south for about one hundred miles and the character of its topography is shown by the fact that although the country to the west is quite well settled and although the great agricultural plain of the Sacramento is on the east, there is as yet no wagon road crossing the range. The main ridge is reported as being quite uniform in height throughout the greater portion of its extent. Only two peaks have been definitely measured, Snow Mountain near the southern end being 7,030 feet in elevation (U. S. C. G. S.), and Mt. Linn near the northern end being 8,604 feet (U. S. G. S.). Hunters and sheep herders report that portions of the ridge to the southward of Snow Mountain surpass it in elevation. A map recently published at Sacramento gives one of the peaks, Mt. Ripley, as 7,500 feet without, however, quoting any authority. Snow Mountain was visited in 1900, and again, with a camera, in the past summer. Four or five square miles on the northern and eastern slopes of the peak were found to bear clearest evidences of glaciation, as will be described in detail below. The northern part merges into the Klamath Mountains, and connects with the glaciated area described by Diller and Hershey. Snow Mountain, a slightly elevated portion of the main ridge, is situated northeast of Clear Lake on the eastern boundary of Lake County. The Coast Survey monument at the top marks also the southwest corner of Glenn County, and the northwest of Colusa. Four Springs at the eastern foot of the mountain is the most convenient base for exploring the peak. The hotel at the Springs is accessible by wagon road from Sites or from Willows.

From Four Springs a private road leads northward up the slope of the mountain to the Caldwell ranch, at an elevation of about 2,850 feet. Thence a steep but well-marked trail leads westward over the ridge between the peaks of Snow Mountain. Distinct signs of glaciation are first seen about two miles from the summit at

5,950 feet elevation (aneroid). Here the trail crosses a terminal moraine which lies at the mouth of a hanging valley (A of the sketch model) that opens northward into the sharply incised gorge of one of the branches of Stony Creek, the main drainage channel of the region. (Fig. 1.) The moraine lies partly against a low elliptical hill which extends in the direction of the main valley. The rounded outline of this hill indicates that it was probably over-riden by the ice. The moraine is rather closely overgrown with brush, but there are several exposures of unstratified detrital material, the fragments vary-



FIG. 1.—Model of Snow Mountain, showing glacial features.

ing greatly in size. The surface of the moraine is very uneven, one of the larger depressions being some 300 feet in length and about 25 feet deep. Just above the moraine at its east end is a small meadow not yet fully drained by the channel which is being cut by the overflow in the rainy season. The U-shaped valley above the moraine heads against the main ridge of Snow Mountain without subdivision into water-cut gorges and ravines and also without the steep angular walls so common in the granite in similar valleys in the Sierra.

The main rock of Snow Mountain in the area studied is diabase

and weathers rapidly giving extensive talus slopes that mask all cliffs not swept by active streams. The weathering is so rapid and wide-spread that it required considerable search to obtain a specimen sufficiently unaltered to show fairly the character of the rock. Glacial markings would not usually be preserved in such rock except where it was protected from the weather. Definite glacial striæ were found in this valley, only at the eastern end of the elliptical hill already mentioned.

Going westward toward the main pass, other tributary valleys, B and C, have the same northward exposure and general characteristics as A, but lack definite terminal moraines. They are larger and their glaciers apparently merged into the glacier of the main valley. The third valley, C, has steeper cirque-like walls and its floor affords several examples of well-preserved glacial striæ with the bearings approximately parallel to each other and to the axis of the valley. The photograph reproduced in Fig. 2 is from this valley and is a fair representation of the definiteness of the striæ found in some fifteen to twenty of the best bed-rock exposures. Angular fragments with one or more faces striated were not wanting in the drift, but the striæ found on bedrock make it unnecessary to consider them as part of the evidence of glaciation. This is fortunate in a much-faulted region like the Coast Ranges, where the scratches on "slickensided" surfaces closely simulate glacial striæ. The ridge between B and C is over 100 feet in height and striæ on top show that it was covered by the ice. At D the main valley floor rises in steps of 100 and 150 feet, and the valley ends in a well-rounded head. The walls are covered with talus almost to the top, with a somewhat indefinite bench in several places at a rather uniform level over 200 feet below the top of the ridge.

Crossing the main divide of the northwest slope of the mountain, the best developed form of glacial valley was found in F, which extends nearly two miles northward before its flat floor is cut by stream erosion, into the steep gorge characteristic of the slopes below the 6,000 feet contour. The steep walls at the head of this valley inclose a little meadow, that is a duplicate of many of the smaller glacial meadows of the High Sierra. Some distance below, the valley floor descends abruptly some 200 to 300 feet to a second meadow, again duplicating characteristic Sierra forms in this step-like succession of basins. The sharp ridge to the west of this valley ends near the second meadow in the most precipitous cliff found, and from near its base runs a well-defined moraine some 25 feet in height. This is evidently the lateral moraine of valley F augmented by material from

a small tributary glacier coming down from the westward. The rock exposures in this valley show much weathering, and despite the surprisingly striking glacial forms shown in the topography, no striæ were found in the brief time given to examination.

Recrossing the divide, the north fork of the main valley, E of the sketch model, has the largest meadow of all and also some well-preserved roches-moutonnées with striæ at the base, very distinct, but too small to show well in the photograph. (Fig. 3.)

Glacial striæ are found on bedrock in several places in this valley



FIG. 2—Striæ found on bed rock in glaciated valley of Snow Mt.

and lateral moraines on both sides, the most definite being on the north slope of the lower part of the valley.

This slope is well wooded and difficult to photograph, but in the field the boulders and unstratified material of the moraine and its uneven surface are in striking contrast to the smooth talus of the main valley with its uniform and rather fine fragmental material.

Owing to lack of time and the difficulty of working in a region entirely without reliable maps, no attempt was made to fix the limits of the glaciated area in this portion of the range. The work done,

however, shows clearly the fact of glaciation and that the lower hypsometric limit is below the 6,000 feet contour.

Some consideration will now be given to the general topography and the climatic conditions and to a brief comparison with the glaciated portion of the Sierra Nevada lying in the same latitude. The remarkably flat top of the main ridge (see Fig. 4), and the rather mature topography for a mile or two of the higher slope on either side, mature where not rejuvenated by glacial erosion, all suggest that the mountain forms part of an uplifted oldland. In fact, Diller* merely from a distant view, has already described Snow Mountain



FIG. 3—Well-preserved Roches-Moutonnées in Valley F., Snow Mt.

and St. John, a nearby peak, as “rising but little above the flat portion of the Klamath peneplain.”

This remnant of an old peneplain forming the summit of this portion of Snow Mountain range constituted the névé field in glacial times. Wherever by headward erosion the streams of the newer cycle initiated by the last great uplift had reduced this flat top to a narrow ridge it is impossible that any glaciers were formed.

The extremely youthful gorges of the middle slope of the mountain are rapidly working their way headward into the upper valleys and it will be very difficult if not impossible to determine exactly the lowest extension of the ice in those valleys which were glaciated.

* Bulletin 196, U. S. G. S., p. 20.

Of the upper valleys seen from the main ridge, beside those described above, the majority showed from a distance no sign of glaciation, but one or two had the U shape and the rounded heads suggestive of possible ice action. The local causes determining glaciation in these different valleys were probably exposure, relation to the snow-drifting winds, and local precipitation, the latter probably varied greatly along the range with the adaptability of the valleys on the western slope to the creation of a strong local up-draft of the moisture bearing storm winds. Some forty miles to the southward, near the summit of the next main ridge of the Coast Ranges, is a station that frequently reports to the Weather Bureau an annual precipitation of from 100 to 130 inches in a region where the surrounding stations report about one half that amount. While the cause of the heavy



FIG. 4—Flat top of the Main Ridge about one-half mile southeast of Snow Mt.

precipitation has not been carefully worked out, it appears that it is probably due to a rather steep valley opening to the winter storm winds in such a way as to act like an upward pouring funnel. The condensation in such up-pourings of nearly saturated air might well in Pleistocene times have determined a local glacier on a mountain range, the top of which was along the critical line marking the border of glaciation.

The latitude of the main peak of Snow Mountain is $39^{\circ} 22' N$. Directly to the eastward in the Sierra Nevada is the glaciated region to the northward of Lake Tahoe. A comparison of the limits of glaciation and of the records of present precipitation in the two regions is of interest. As the crest of the Sierra at this latitude is some 2,000 feet higher than Snow Mountain, comparison should be made with some of the small glaciers of the ridges of the western Sierran slope. The Canyon Creek glacier heads among peaks vary-

ing from 7,000 to 8,000 feet in height and may be taken as equivalent as the parallel of $39^{\circ} 25'$ passes through its main valleys. The higher peaks are described as having projected above the surface of the glacier. According to the contour lines, the cirques must have headed at from 6,500 to 7,000 feet. The lower limit of the ice "is not established beyond doubt" but the morainal matter described about Graniteville indicates that it was at least as low as 5,500 feet. These upper and lower limits agree closely with those found at Snow Mountain. The present precipitation for the two regions seems also to be approximately equal.*

In the table below the few stations around Snow Mountain are compared with those of practically the same elevation and similar location in the Canyon Creek district. The figures are from the annual summary for 1909 of the California Section of the Climatological Service of the Weather Bureau:

	FEET. Elevation.	INCHES. Annual Precipitation.
Westward of Snow Mt.		
North Lakeport.....	1,450	47.
Hullville.....	2,250	72.
Helen.....	2,750	136.
West of Canyon Cr.		
Dobbins.....	1,650	68.
Nevada City.....	2,580	76.
Bowmans Dam.....	5,500	113.

At Fout Springs, elevation 1,650 feet, at the eastern base of Snow Mountain and in the rain shadow of the range, the precipitation was over 60 inches for 1909, 30 inches falling in January. On Aug. 27 of the same year extensive snow banks were still to be found on Snow Mountain, although the *mean* temperature for June to September at Fout Springs, six miles distant was 67° F. with maxima for the same months varying from 91° to 98° F. The nearest corresponding station east of the Sierra for the Canyon Creek district is Boca, elevation 5,531 feet, where the yearly precipitation was but 37 inches.

It is, of course, recognized that so many local conditions affect the record of precipitation that the figures quoted above are merely suggestive. Their pertinence in studying the general question of Pleistocene glaciation lies in the fact that it is commonly accepted that topography was practically the same then as now and that there is no evidence of a change in our wind system. The Coast Ranges lie squarely athwart the prevailing west winds from the Pacific and, other things being equal, precipitation should be heavier at the same

* Colfax Folio, No. 66, U. S. G. S., p. 7.

elevations than in the Sierra to the eastward. The records for Snow Mountain and the Canyon Creek region show approximately equal precipitation for the same elevations and approximately the same mean temperature is indicated by the fact that at 7,000 feet snow lingers till late summer in both regions. That both regions were formerly glaciated suggests the working hypothesis that the higher portions of the Coast Ranges when situated in areas of relatively heavy precipitation were possibly subject to Pleistocene glaciation. The most promising fields for further study according to this hypothesis will now be briefly indicated.

If the reported heights of other portions of Snow Mountain are confirmed, glaciation may be found some fifteen to twenty miles southward of Snow Mountain. To the northward the higher peaks should show signs of ice action wherever they have sufficient area to have afforded gathering fields for snow. To the north of west from Snow Mountain and distant some twenty miles is Mt. San Hedrin, its rather broad flat summit rising to 6,183 feet. As rainfall increases rapidly in this direction it should be included in any comprehensive search. Southward through Central California the ranges decrease in height, Mt. Diablo nearly opposite the Golden Gate being but 3,849 feet in elevation. South of Monterey Bay the height increases again, Santa Lucia range having one peak, Santa Lucia West, that reaches to 6,000 feet. (U. S. C. G. S.) The rainfall maps of the State do not give this as an area of unusually heavy precipitation. It must be remembered, however, that the higher elevations in sparsely settled regions like this have practically no reliable data for rainfall maps. Still further southward the complex of mountains formed by the meeting of the three great mountain systems of the State is a region of relatively heavy precipitation. Several of the peaks are over 7,000 feet high and Mt. Pinos rises to 8,826 feet.

The nearest glaciated region which may be taken for comparison is the upper basin of the Kern River,* where Lawson has fixed the southern limit of glaciation at $36^{\circ} 20'$ ($36^{\circ} 16'$ according to the Kaweah topographic sheet since issued). The elevation of the ridge against which head the small glacial cirques on the west side of the little Kern is about 10,000 feet, with the cirques themselves heading at from 9,000 to 9,500 feet. The rainfall maps for the higher parts of the Mt. Pinos group and for the Kern Basin region are necessarily generalized from rather distant stations. The Southern Sierra is, however, credited with the greater precipitation. In addition, the

* *Bull. Dept. Geol., Univ. Cal.*, Vol. 3, Plate 31.

Kern region has the higher latitude, its southern boundary being $36^{\circ} 16'$ N. while Mt. Pinos is but $34^{\circ} 57'$ N.

The probability of finding evidences of former glaciation on Mt. Pinos would seem slight from this comparison, but the hearsay evidence concerning snow in late summer and peculiar topography is more encouraging than were similar reports from Snow Mountain. It certainly should be carefully studied, for it is very possible that the precipitation is greater than reported. It should also be noted that Mt. Pinos is on the border line of two of the climatic divisions of the State and that such a border zone may have had a proportionately greater rainfall during the climatic variations of the glacial period. Whoever undertakes to examine this region should remember that the San Andreas Rift, along the northern part of which motion occurred in the earthquake of 1906, passes only some three miles to the northward of the summit of Mt. Pinos. The irregularities of surface caused by landslides and other movements along a fault zone might be confusing in some relations to an observer predisposed to see morainal topography.

Résumé: Briefly summarizing the paper, it may be stated that clear evidence of glaciation exists on Snow Mountain; that a strong probability exists that other areas in the northern Coast Ranges were also glaciated; and that there is at least a possibility that some of the peaks of the southern Coast Ranges including the Mt. Pinos Group may have carried small Alpine or cliff glaciers.

GEOGRAPHIC INFLUENCES IN AMERICAN SLAVERY*

BY

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The Coastal Plain in Alabama and Mississippi, as in the other regions, is belted and largely covered with a veneer of Lafayette and Columbia sediments. The chief distinction between the Coastal Plain in the areas before considered and in the Western Cotton Belt is the occurrence of extensive limestone belts in the latter. (Fig. 18.) While the Lafayette and Columbia formations cover much of the Gulf Coastal Plain, they are absent or meagerly developed on the

* Concluded from *Bulletin* January and February, 1911.

limestone belts. The soils in these limestone belts are, therefore, largely residual, calcareous, and usually have a high humus content which gives the soil its black color. The soils of these belts have considerable clay and require somewhat careful preparation, but they are durable and extremely fertile.

There are two prominent limestone belts in the Coastal Plain of Alabama and Mississippi, of which the northern one was by far the more important. Both of these belts are locally known as "prairies," a word that suggests their rolling and relatively level surface. The Upper or Central Prairie has been developed on an impure clayey

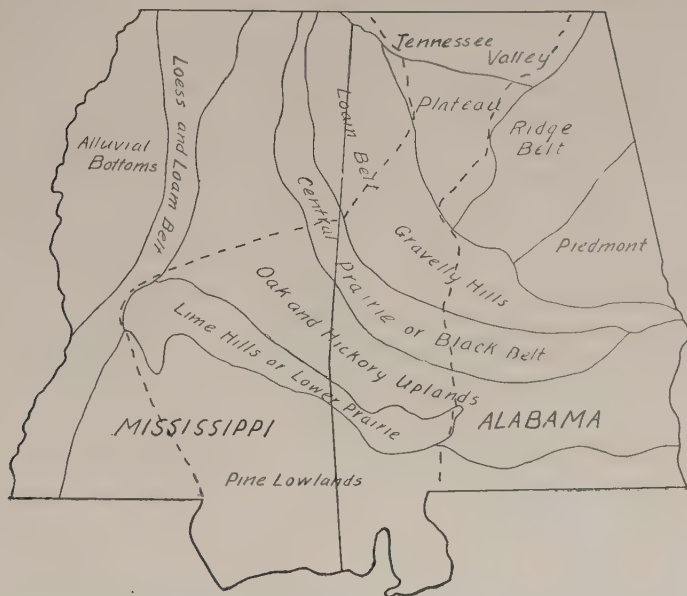


FIG. 18—Map showing the principal divisions of western Cotton Belt, east of the Mississippi, in Alabama and Mississippi. The broken line shows the area from which the Graphs in Fig. 21 are made. (After Smith and Hilgard, 10th census, vol. vi, Part ii.)

limestone of Cretaceous age, known as the "rotten limestone." It is a crescent-like trough bounded on the south by a low cuesta and on the north by sandy hills of the Lafayette formation. It was and is widely known as the "Black Belt."

The Lower Prairie is less important than the Central Prairie, both with respect to their relative areas and to their soils. This belt, known locally as the "Lime Hills," has been developed on a cherty limestone. Its surface is considerably more dissected than that of the Central Prairie. Its soils are, in general, more fertile than those

of the adjacent belts, but are somewhat inferior to those of the Upper Prairie.

The Upper Loam Belt is characterized by a growth of oak, hickory and short-leaf pine. It is practically covered by the Lafayette formation which here is, in general, a loam. The soil is fairly fertile, responsive and easily tilled, but, like most loams, it did not prove durable under the one crop cultivation that prevailed during the slavery period, and, indeed, is still the prevalent method. The Upland Belt between the two limestone belts has much the same soil as the Upper Loam Belt. Generally speaking, the soils in this belt grade from loams in the northern part to sands in the southern portion. This gradation in soils is somewhat well marked by a change from oak and hickory in the north to pine forests in the south. The Central Prairie with adjacent portions of the two boundary belts is often termed the "Central Cotton Belt."

The Pine Lowlands to the southward and the small portion of the Cumberland Plateau were unimportant areas. Their soils were too

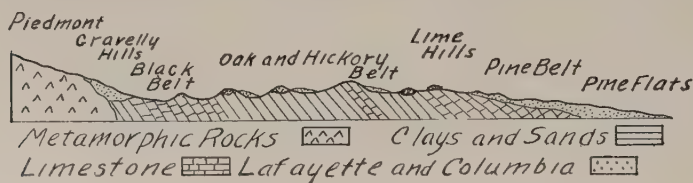


FIG. 19--Section across the Coastal Plain from the Piedmont to the Gulf in Central Alabama. (After E. A. Smith.)

sandy to offer inducement to the cotton planter. The Yazoo Bottom and Loess Belt will be included in the discussion of the Mississippi Lowland Belt.

The Ridge Belt and the middle Tennessee Valley constituted an important, though small, cotton growing region. The limestone and shale valleys between the ridges together with the alluvium along the narrow flood plains or "bottoms" of the streams gave fertile soils. The Tennessee Valley here is analogous in structure and soils to the Nashville and Louisville Basins. The River has eroded the overlying sandstones of the Plateau and opened its valley in the underlying limestones. (Fig. 20.) A narrow strip of fertile alluvium along the river is flanked on either side by fertile limestone soils. These latter soils grade into the sandy soils of the uplands, whose local name, "The Barrens," suggest their infertility.

Such were the divisions of that part of the Western Cotton Belt

that were included in the Coastal Plain. A profile and section of this belt is shown in Fig. 19.*

It will, perhaps, be better to take up first the responses of slavery to the Cotton Belt of the Coastal Plain although, chronologically, the institution was established in the lower portion of the Mississippi Lowland at a much earlier date. We have noted that this Western Cotton Belt was settled by an overflow from the older slave states. The development here is especially interesting from an economic standpoint. Here slavery was largely a business proposition and slaves were located with reference to returns on the investment. In the East, slaves were often inherited and slavery had a patriarchal cast.† The institution in the West, therefore, was especially mobile and responsive to geographic environment. Here, too, the plantation system developed as in the East as an effective organization of slave labor analogous to the development of the modern trusts.‡ The holdings of the pioneers were restricted or diminished both by the competitive bidding for public lands by the large slave holder and by the tempting prices which the capitalistic slaveholder could offer for the lands of the small farmer.

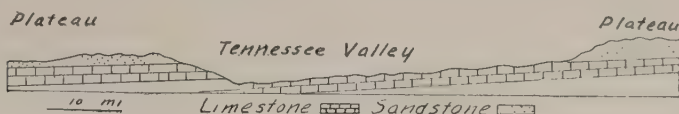


FIG. 20—Section across the Tennessee Valley in Alabama.

The census of 1820 shows a preliminary invasion of this region in two directions. The slave system of the Eastern Cotton Belt was spreading westward. Also, extending northward from the Mobile area, was a sparse slave population. The Indian lands not yet open to settlement lay in the fertile cotton belt. A decade later slavery was crowding on these lands from the north, south and east with a result that by 1834 the production of cotton in Alabama and Mississippi equaled that of the Carolinas and Georgia. In this same year the crop in Alabama, Mississippi, and Louisiana exceeded by half the crop in the Tobacco South and the Old Cotton South.§ The cheap, productive lands were rapidly draining slaves from the older slave states, especially from the Tobacco South. Title to and possession of the Indian lands soon became possible and in the decade

* Vol. VI, Soils of Alabama, by E. A. Smith, and Vol. V, Soils of Mississippi, by E. W. Hilgard, 10th census.

† F. J. Turner, *Colonization of the West*, *Amer. Hist. Rev.*, Vol. II, 1905-'06.

‡ U. B. Phillips, *The Origin and Growth of Southern Black Belts*, *Amer. Hist. Rev.*, Vol. 11, 1905-'06.

§ F. J. Turner, "Rise of the New West," New York and London, 1906.

from 1830 to 1840 slavery spread into the middle portion of the Coastal Plain, and from 1840 to 1860 it became markedly dense in the Black Belt.

The Lower Prairie is not delimited in mapping the slave population even in 1860. During the slavery period the Federal census did not, as a rule, give the population of the county sub-divisions in the South. The Lower Prairie is a narrow belt and counties in this belt usually include large areas of the adjacent belts whose sparse slave population lowers the average that the maps show. Moreover, the adjustment of slavery to soils was at best very incomplete. The settlement and development of areas was not gradual but intermittent.

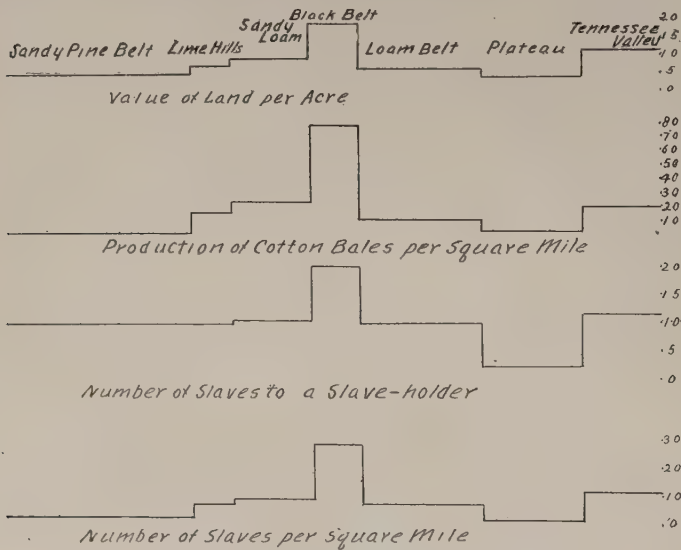


FIG. 21—Graphs showing Data from the Belt shown in Fig. 18.
Data from the census of 1860.

The Upper Prairie was not by 1860 so well settled that the slave owners were migrating and the belt was still gaining rather than losing slaves. It is interesting to note that in 1880, twenty years after the slavery period, the Lower Prairie shows the expectable high cotton production that sharply differentiates it from adjacent belts.

The graphs in Fig. 21 well summarize the contrasts in the different areas. Cotton production with its concomitant land values and slave densities, are seen to be at their maxima in the Black Belt, and at their minima in the Plateau. The belts adjacent to the Black Belt show high averages both because of their natural fertility and because counties in the Black Belt often extend into the adjacent

belts. The Pine Lowlands were of minor importance. The plantation system represented by the third graph shows a general parallelism to the other graphs.

The Gulf Coastal Plain is broken midway by the Mississippi Lowland, a lowland with an average width of 50 to 75 miles and an approximate length of 500 miles. (Fig. 22.) On the west this lowland extends for long distances up the main tributary rivers. Into the Coastal Plain the Mississippi has sunk a shallow trench which it is now for the most part, aggrading. The soils in this lowland are alluvial.

When an aggrading stream overflows its flood plain, its velocity suffers its first check on the flood plain near the stream, and here in consequence the heavy materials and a considerable proportion of its lighter material are deposited. The finer silts and clays are laid down farther back from the stream. The topographical results of such a process are typically an elevated belt, the natural levee, along the stream with lower land and swamps farther back from the stream. The soils on the natural levee are sandy or loamy, while the soils on the lowlands are heavy silts and clays. A typical soil section in passing from a stream to the back lands would include consecutively a narrow belt of sand or sandy loam along the stream, paralleled by a belt of sandy loam which grades into the clays and silts of the back lands (Fig. 23). A gradation soil in the better drained clay and silt areas is the famous "buckshot" soil, so called from the fact that after it is plowed it often dries into small grains or "buckshot." Such a combination of chemical fertility and porosity makes this type one of the most fertile soils in the world. Frequently there are low ridges in this belt which mark old stream courses that are now deserted.

During slave times, and, indeed, at present practically only the natural levees are in cultivation. Here on the "front lands" were the plantations, each of which usually had a river frontage for easy shipment. These natural levees, often isolated from each other by miles of swamps, were natural social and oftentimes political units and were frequently referred to as "country," for example, Lafourche country in lower Louisiana. A typical area of alluvial soils is shown in Fig. 23.

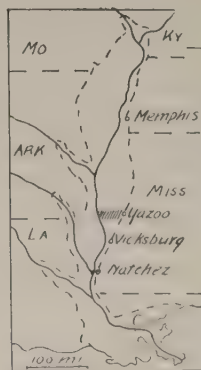


FIG. 22—Sketch Map of the Mississippi Lowlands. The soil area shown in Fig. 23, is cross-lined.

A relatively narrow belt of loess fringes most of the lowland, especially in its eastern margin. This belt is considered in connection with the lowland since it was closely identified therewith in crops and in the development of slavery. For a considerable distance back from the lowland, the loess belt is well dissected owing to the steep gradient of the streams and the loose, unconsolidated condition of the loess and its underlying formations. This dissected belt is in consequence known as the "Cane Hills." The hill tops are often arable but there is a considerable proportion of the area that is too rough for cultivation. Further back from the lowlands, the diminished dissection of the loess belt finds expression in the local name "Flat Hills." The loess belt as a whole is extremely fertile.

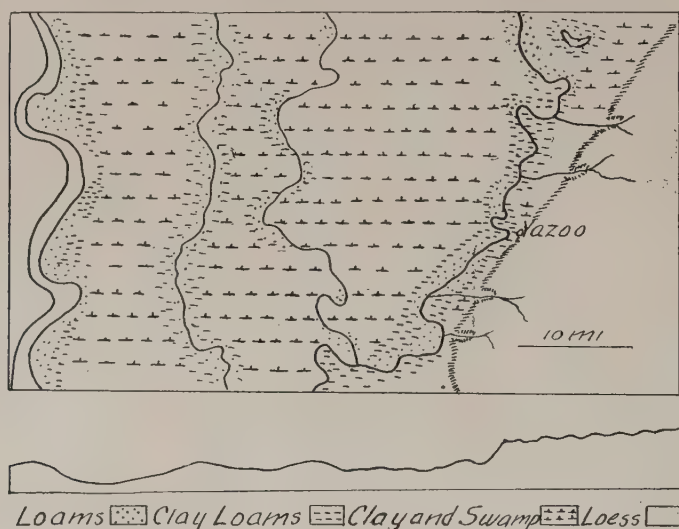


FIG. 23—Soil Map and Profile of a portion of the Mississippi Lowlands and Loess Bluffs in Mississippi. (Soil Data from the maps of the U. S. Soil Survey; Profile from the Map of the Alluvial Valley of the Mississippi Valley, by the Mississippi River Commission, 1887.)

While Louisiana is the most typical lowland state, it should be noted that the lowlands include but a fraction of the state's total area, and this small proportion of lowland to upland is true in greater degree of the other states lying in part in this division. It is the extreme productiveness of the lowland that gives a common impression that Louisiana especially is largely alluvial lowland. Much of the state is covered by the Lafayette and Columbia formations and has the soils characteristic of those formations.

It was in the alluvial lowland of Louisiana that one of the minor

slave crops was developed. Sugar cane is a variety of the grass family that thrives best in a hot, sunny, humid climate where frosts are infrequent. A heavy loam, tenacious of moisture, is a favorable soil.* Southern Louisiana with its high temperature, copious and evenly distributed rainfall and heavy, fertile soils, offered a productive field for cane cultivation.

Cane was introduced into Louisiana in the middle of the eighteenth century but did not become commercially important until the beginning of the next century, at about the time of the extension of cotton culture. It did not, like rice on the South Atlantic seaboard,



FIG. 24—Map showing the production of sugar in Louisiana, 1860. Density of production is indicated by the spacing of dots.

prepare the way for cotton culture. Rather the two crops developed side by side. Cane culture, being intensive and profitable, was nearly as well adapted to slave labor as cotton culture. The cane producing areas in Louisiana were largely in the lowland below the Red River together with an important area on the loess belt. (Fig. 24.) The Louisiana area in 1860 produced 96 per cent. of the entire cane sugar crop of the United States, and 91 per cent. of cane molasses. So far as soils were concerned, cotton would grow well in this area, especially on the lighter soils. However, the heavy autumn rains often destroyed or damaged the crop when it was ready for picking.

Slavery existed in the lower part of the alluvial lowland in early

* W. C. Stubbs, "Sugar Cane," *Rept. of the Louisiana Experiment Station*, Vol. 1.

colonial times, but its principal expansion, like that of the rest of the western Cotton Belt, was deferred until the second decade of the nineteenth century when sugar and cotton culture became prominent. In 1810, when the first Federal census of this region was taken, a considerable slave density was shown on the delta and the loess. In ten years the slave area had spread most upon the loess and the slave density had increased in the lowland above New Orleans.

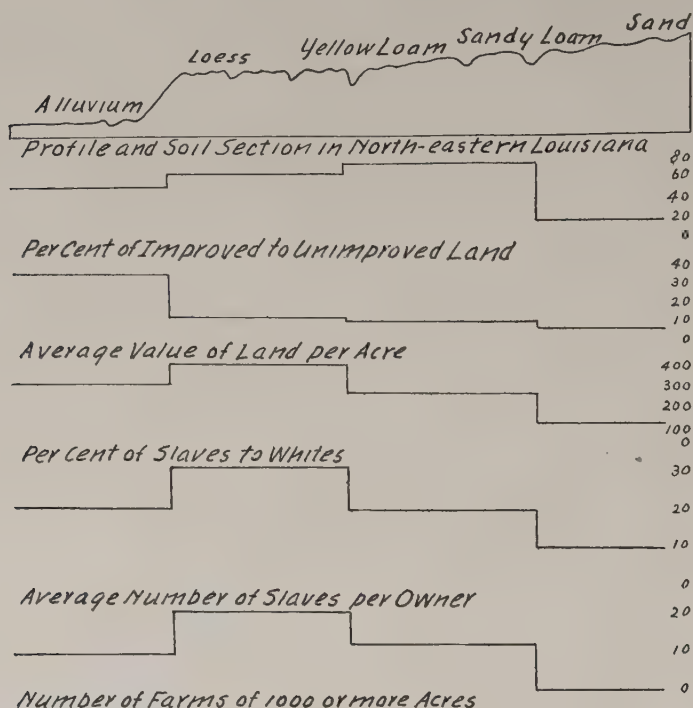


FIG. 25—Soil section and slavery factors on the Mississippi Lowland and adjacent belts, 1860.

By 1840 there was a heavy slave density in the lowlands in Louisiana, and in the Yazoo Bottoms of Mississippi and in the contiguous loess belt. In the next two decades the density increased on the lowland and loess, but it extended much farther north on the loess than on the lowland. Sugar in the southern, and cotton in the northern parts were the main crops, although in the Kentucky region considerable tobacco was grown.

The graphs taken for 1860 in Figure 25 are interesting and, for the most part, typical of this region. The section is taken along the

northern boundary of Louisiana and extends westward along the sandy Pine Lowland, the soil of which is comparatively infertile; the Sandy Loam Belt, known as the Oak and Hickory lands, with a soil of fair fertility; the Yellow Loam Belt which is transitional between the Sandy Loam Belt and the Loess Belt; the fertile Loess Belt, and lastly a county (Point Coupée) in the Lowland.

Less than half the lowlands was under cultivation in this area and it is probable that the percentage here was above that of the lowlands as a whole. Point Coupée County was early settled, and most of the available land and also the lands that admitted easy reclamation, were under cultivation. The higher percentage of improved lands in the loam belt than in the loess belt is to be explained in part by the dissected surface of the western part of the loess belt. A considerable proportion of the loess is "rough land" and not capable of easy cultivation. The Pine Lowlands were too unproductive to pay for clearing their forests.

The high value of the arable loess land brings up the average land value in this belt above that of the adjacent loam belt. The average value of land in the lowland is higher than in the other belts, despite the fact that there is a high percentage of waste area in the lowland. There are no statistics in 1860 to show the relative acreage of the arable lands in the lowland, but the high value of the front lands carried the average value of the whole to a high figure. The relatively low values of land in the loess in contrast with the adjacent belts is not typical of the loess belt as a whole. Further north the loess belt had a higher relative value.

The last three graphs approximately represent the development of the plantation system. These reach their maxima in the Loess Belt. The highest slave percentage, the largest plantations, and the largest individual slave ownership are found in the loess belt. The lower percentages of these factors in the alluvial belt point to smaller plantations, a larger number of owners and perhaps a more intensive cultivation. The Pine Belt in all these factors is insignificant.

Cultivation by slave labor was characteristically extensive rather than intensive, an exploitation rather than a development. The usual procedure was to search for fertile lands, to exhaust them by careless, extensive cultivation, and then to move on to fresh lands. As a geographic response slave cultivation did not bring out the possibility of soil production under careful tillage.

We have noted how the development of the western Cotton Belt drew the slaves from the Tobacco South, and in less degree from the eastern Cotton Belt. By 1860 slavery had secured a strong foot-

hold on the Coastal Plain of Texas. In this state the extension is again resumed of the Black Belt and loam and sandy belts which are separated from homologous areas in Mississippi and Alabama by the Mississippi Lowland. These belts end in the southwestern part of the state (Fig. 26). It was here, had slavery continued a decade or so beyond 1860, that a new expansion would have occurred. The wisdom of the pro-slavery statesmen in securing Texas for slavery is indicated by this state's increasing rank in cotton production. By 1900, 26 per cent. of the cotton grown in the United States was produced in Texas, and much of the Texas crop was grown in the Black

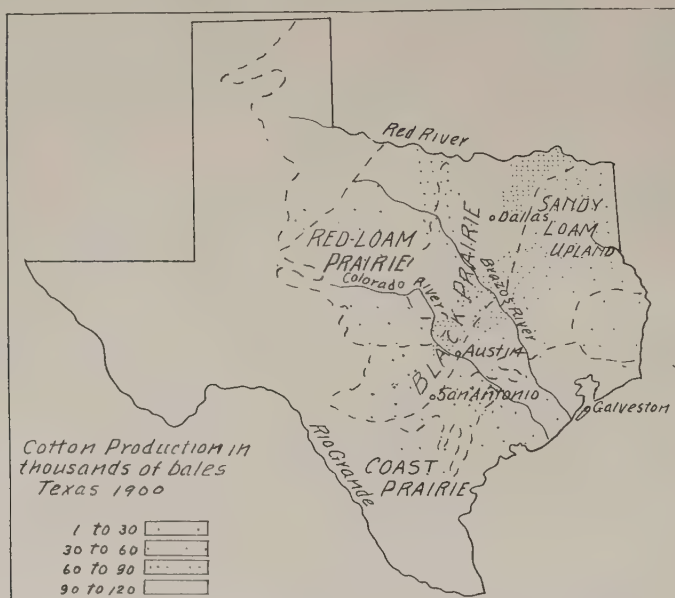


FIG. 26—Cotton production, 1900, and main soil belts of Texas.
(Soil belts after Loughridge, 10th census, Vol. 5, Part 1.)

Prairie and adjacent belts which are homologous with the similar belts east of the Mississippi. (Fig. 26.) Had slavery been allowed to expand, the Texas portion of the Western Cotton Belt would undoubtedly have drawn the slaves from the Carolinas and Georgia in the same manner as the Southern Belt reduced the Tobacco South to a slave raising region.

Résumé: Although slavery was introduced into all the colonies, it ultimately became important only in those geographic regions that permitted the profitable cultivation of the slave crops, and these crops were limited to a warm climate. On the basis of the main

slave crop, the South may conveniently be divided into two parts. each having varied topography and soils. The Tobacco South lay north of the isotherm which conditioned the profitable cultivation of cotton. Tobacco here was the main crop with cereals as subsidiary crops. Beginning on the Coastal Plain, the culture of tobacco with its concomitant system of slave labor, expanded first to the Piedmont, later to the Great Valley and Ridge Belt, and finally to western Kentucky and Tennessee, being concentrated especially in the two limestone basins of those states.

In early colonial times, slavery acquired and maintained a strong foothold in the Sea Islands, and the adjacent mainland in South Carolina and Georgia with rice, indigo and sea island cotton as the main crops. The Cotton South began when upland cotton became available, and slavery and upland cotton cultivation expanded together. The first notable expansion was from the Sea Island region to the Piedmont and inner Coastal Plain in South Carolina and Georgia, which became known as the Eastern Cotton Belt. The last expansion was into the Western Cotton Belt which included mainly the Gulf Coastal Plain and the Mississippi Lowland.

SLEEPING SICKNESS IN UGANDA

BY

PETER MAC QUEEN*

About twenty miles from Kampala lies the hospital Kyetume, where I was told there were 700 patients suffering from sleeping sickness. I decided to stop over night at the hospital. I was most hospitably received by Dr. Claude Marshall, who was then in charge. Sleeping sickness came into Uganda about four years ago. It is caused by the bite of the tsetse fly, which was brought from the Congo by the caravans passing through with ivory to the coast. In four years 250,000 of the most promising natives of Africa have died from the terrible disease. No man who has had an attack of sleeping sickness has ever yet authentically recovered.

The hospital is laid out among beautiful gardens, on a hill overlooking a splendid agricultural section. Most of the patients are treated in a village which the English Government has established.

* By the courtesy of Messrs. J. C. Page & Company, Boston, these extracts on Sleeping Sickness in Uganda are here reproduced from Mr. Mac Queen's excellent book "In Wildest Africa."

Those who are not seriously ill are kept in the village until the disease has made considerable progress. After that they are brought into the general buildings of the hospital itself. The disease will kill a man in any space of time, running from two days to two years. No absolute cure of the disease has yet been found.

Great Britain is making gigantic efforts to thwart the power of this dreadful foe. Already she has under the care of skilled physicians no less than 20,000 patients. The people living along the shores of Lake Victoria Nyanza have been removed back into the country several miles, and every possible attempt has been made to exterminate the tsetse fly. The most successful attempt yet made has been the planting of a certain shrub in the marshes where the fly lives. The shrub is certain death to the tsetse fly. The area infected by the sleeping sickness thus far has been confined to the islands in the northwest of Lake Victoria Nyanza, and the shoreland from Entebbe to Jinja, a distance of about ninety miles. But the fear is that the disease will spread through all the provinces of the Upper Nile; and at the present rate of decrease in population it is estimated that in twenty-five years the entire population of Uganda will have disappeared. It might also spread to the Sudan, Rhodesia and Portuguese and Africa and decimate half the continent. The tsetse fly, whose scientific name is *glossina palpalis*, breeds in moist and swampy land. Scientists believe that it gets some of its virus from the body of the crocodile. Dr. Koch declares that it also feeds on the bodies of waterfowl frequenting swamps. If it bites a person after it has imbibed this virus, or after it has bitten a human being infected with the sleeping sickness, that person is almost certain to develop the fatal malady.

On the island of Buvuma it was estimated four years ago that there were 20,000 healthy people; to-day I am told there are less than twenty individuals. In the Sesse Islands, of a population of 30,000 four years ago, only 12,000 remain to-day. These are examples of the devastation of this gruesome pest. The British authorities have established six great hospitals or stations in Uganda for the treatment of sleeping sickness. They contain nearly 20,000 patients and are located as follows: (1) Sesse Island; (2) Kyetume, near Kampala; (3) Busu in Usoga; (4) Bulumasi; (5) Island of Buvuma; (6) Entebbe. The treatment followed in these hospitals is an injection of atoxyl, composed of arsenic, aniline and carbolic acid, discovered by Dr. Koch, the famous German specialist on tuberculosis. During 1908, in his official report to the Minister of the Interior with regard to the progress made by the German expedition

sent to East Africa to investigate the sleeping sickness, Professor Koch announced that he had discovered a specific against sleeping sickness similar to that which the doctors already possess against malaria in quinine. The remedy, which is a preparation of arsenic, is called atoxyl, and destroys the trypanosomes, the germs of the disease.

Professor Koch's close inspection of the habits of the *glossina palpalis*, which British investigation had already proved to be a disseminator of the disease, led him to the conclusion that the sleeping sickness can be spread also by other insects, such as for instance, the *glossina fusca*. The *glossina* lives principally on the banks of lakes, among stones, dried branches and plants; and feeds on the blood of the waterfowl which frequent the surface of the water, and also on the blood of crocodiles. These latter animals, Professor Koch declares are one of the chief reasons for the existence of the *glossina* in the Victoria Nyanza territory.

In order to study the *glossina* and the sleeping sickness together, Professor Koch availed himself of the offer of an empty mission-house placed at his disposal by the British authorities at Bengala, in the Sesse Islands, to the northwest of the Victoria Nyanza. The Professor came to the conclusion that the only remedy which would be efficacious would be one that destroyed the trypanosomes in the infected persons, as quinine annihilates malaria parasites. After various experiments, Professor Koch decided to employ atoxyl injections of half a gramme in solution, which proved most efficacious and caused no harm. Six hours after the subcutaneous injections had been made the trypanosomes were unchanged, but eight hours after there was no sign of trypanosomes, while the general condition of the patient had improved. In three weeks patients who were seriously ill when the treatment began, and who, without atoxyl, would certainly have died, had improved to such an extent as to leave no doubt in the Professor's mind of the efficacy of the remedy.

Unfortunately, a week after Dr. Koch's report appeared, Sir P. Monson wrote to the *Times* that it was optimistic, that a relapse invariably occurred, and that trypanosomes were found in the blood even after a year's alleged cure. He gave cases where monkeys that had been inoculated with the blood of patients who had undergone arsenic treatment soon weakened and died of sleeping sickness.

In August, 1907, Sir Hesketh Bell, the Governor of Uganda, put forward a scheme for the suppression of sleeping sickness and the Treasury authorized the expenditure of the funds required for this work. According to Sir Hesketh Bell's plan, the natives were to be

removed from the fly-infested district on the shores of Lake Victoria to healthy locations inland. The sick were to be placed in segregation camps, where they will undergo the so-called atoxyl treatment. It was estimated that some 20,000 people would have to be dealt with in this manner. It was further intended that all landing stages along the shore of the Victoria Nyanza should be freed from the presence of the tsetse fly by means of a complete clearance of all vegetation. Fords, ferries, and waterholes were to be similarly dealt with, and it was hoped that, by constant and consistent efforts in this direction, sleeping sickness would gradually be stamped out in Uganda. It is a matter for satisfaction that the chiefs fully appreciate the steps that are being taken, and are working loyally with the Government in helping to stamp out what has already proved such a terrible scourge in Uganda.

The work that I saw interested me very much. Twice a day the doctor went through the hospital, treating the patients, cheering and encouraging the down-hearted, ordering food and medicine for the weak. Attended by an interpreter, he asked the various symptoms and explained to me, as we went along, the course and ravages of the disease.

The hospital itself consists of a series of buildings in the native daub and wattle style, common to Uganda, with palm thatched roofs and overhanging eaves. Down the centre of each building there is a wide aisle, and on either side of it are rows of beds, of native manufacture, whereon the patients lie covered with a blanket. Fires are kindled at intervals down this aisle, and most of the patients are too sick to do their own cooking. Some of the victims are young men and women who have strength to go about, and these live in the village in clean sanitary huts, of the ordinary Uganda type. I have seen patients brought in one night and buried the next day. On the other hand, the doctor showed me men who had had the disease for nearly two years and who were still able to keep on their feet.

EXPLORING THE CANADIAN NORTHWEST

Prof. John Macoun of the Geological Survey of Canada wrote a while ago:

"There can be no question about the value of the land north of the Saskatchewan, and settlers going in there are assured of three essentials—wood, water and hay for cattle. * * * The low altitude, and the long day are fixed conditions and will always remain the same."

A vast area north of the north branch of the Saskatchewan is considerably lower in altitude than the southern part of the Canadian prairie. Prince Albert is nearly 500 feet lower than Regina and Stanley on the Churchill River is 260 feet lower than Prince Albert; and, of course the summer days are longer than in the more southern latitudes. These and other facts have for several years encouraged the Canadian Government to study the question whether conditions to the north of the Saskatchewan favor grain growing, and whether there are natural resources of timber, hay, fish and game sufficient to increase the value of these lands to incoming settlers. The Canadian Department of the Interior has just published the latest report on these investigations in Canada's new northwest.*

Mr. Crean's report of his two years' work, including information collected from others, covers an area of approximately 40,000,000 acres. The purpose of his work was to ascertain the value of this area for farming, lumbering and mining. He was expected to report upon the nature of the soil, the various kinds of forest trees, the extent, size and quality of timber, the economic minerals, if any, valuable water power, etc.

The large map published with the report shows that the territory studied embraces most of the region between 54° — 57° N. Lat. and 104° — 113° W. Long. Sprinkled over it are an enormous number of lakes, the names of some of which, such as Lake Montreal, Lac la Plonge, Green Lake and others have long appeared on our maps. Mr. Crean says that large numbers of lakes have never been mapped. His routes are in red, and Hudson Bay posts, Catholic and Protestant Missions and Indian villages are scattered over the sheet; and notes in red type indicate the nature of the country. Remarks such as

* New Northwest Exploration. Report of Exploration by Frank J. P. Crean, C. E., in Saskatchewan and Alberta, north of the surveyed area, 1908-1909. Department of the Interior, Ottawa,

"fine agricultural land," "wheat, oats, barley and vegetables," "heavily timbered valleys," "fine spruce and poplar" are sprinkled over the sheet; near the 57th parallel, lands are marked as "fine" and "barley, oats and splendid gardens," is the legend printed with some of these northern missions and villages. The map is very interesting for the insight it gives into the resources and prospects of a great region to the north of present white settlement.

In 1908, Mr. Crean traversed the eastern half of this area, completing his work in the western half in 1909. He found a sprinkling of whites—missionaries, hunters, trappers and traders, and an important number of Indians. Some of the whites have for years been



FIG. 1—Green Lake Settlement. $54^{\circ} 15' N.$



FIG. 2—Farm at Mt. Nebo on the Green Lake Trail, 65 miles from Prince Albert. About $53^{\circ} 45' N.$

raising vegetables and cereals, with abundant hay for their horses and cattle, but little has been known of them for their habitat has been almost inaccessible, and its resources and capabilities have never been carefully studied.

In the southern part of this district, the country is broken by deep coulees in the prairie. Farther north the country becomes flat and low, with many swamps. In the area visited in 1908, embracing about 22,000,000 acres, Mr. Crean estimates that fully 5,000,000 acres are suitable for settlement as soon as surveyed and made accessible by roads; and an area of about 12,000,000 acres of swamp or land, probably too wet at present for successful cultivation, may be reclaimed



FIG. 3.—Banner oats at English Mission, Lac la Plonge. $55^{\circ} 5' N$. Wheat is grown successfully here.



FIG. 4.—Sawmill at R. C. Mission, Lac la Plonge. Run by water power. $55^{\circ} 7' N$.

at little expense. He believes that all this swamp will eventually repay the cost of reclamation.

The soils are light loam with blue clay or sandy clay subsoils, and much of the agriculture land appears to be as fertile as could be desired. Of course, the winter is cold, but no colder or longer than in some of the settled parts of Saskatchewan. At Portage la Loche ($56^{\circ} 45' \text{ N. Lat.}$) the potato tops had not been touched with frost on Sept. 17. The rainfall is ample though not excessive, and the heaviest rains occur in the early summer, when rain is most needed for farming. The snowfall is generally not heavy, seldom exceeding eighteen inches.

Along the Big River in the southern part of the tract, is a splendid ranching country, hay abounds and water and shelter are easily



FIG. 5—Preston Wheat Field, Stanley, Churchill River. $55^{\circ} 30' \text{ N.}$

obtained. The valley of the Clearwater River, which crosses the 57th parallel would supply a cattle range, which Mr. Crean thinks would be hard to beat. He believes that mixed farming will be the industry best adapted for the entire tract explored. Game of all kinds is numerous, and moose are still plentiful, though they are being killed in large numbers by the natives and wolves. The staple food of the Indian is fish, and he has an ample supply. White fish are found in all the myriad lakes and rivers; most of the country is covered with small timber, not generally of commercial value, though usually there is ample timber for the use of the settlers, but not enough to supply any lumber industry.

In the northern part of the region north of the Churchill River,

is a district of much promise from a mineral point of view. There is an enormous amount of water power which may be utilized to create industrial centers. On almost every stream there are sites where small water power may easily be developed for grist mills, saw mills, pumping and lighting plants.

Mr. Crean says that wheat may be grown in almost any part of this northern region. Of course northern latitudes increase the likelihood of summer frosts; but wheat, barley and oats are now matured every season in portions of this area. The settlers at Meadow Lake say that two loads of hay will winter each head of stock; and hay grows in such profusion that two loads to the animal may easily be obtained even for a large herd of cattle. He believes that pigs also will thrive well in the north and though this territory



FIG. 6.—Potatoes at English Mission, Lac la Plonge. 55° 5' N.

can never compete with the more southerly latitudes in the wheat market, still by judicious mixed farming it will eventually be equally productive and support a dense, thriving population.

The Meadow Lake section, north of the 54th parallel, is practically a prairie and contains in Mr. Crean's opinion, some of the very finest farming land in Canada. The soil is rich, there being in some areas 24 inches of black loam, with clay subsoil. The open prairie country is about twelve miles wide and extends from Meadow Lake about fifty miles west. At an Indian farm instructor's house, he saw a plot of five acres of the finest oats; and in the gardens are practically all the vegetables raised in southern Canada. One of the traders, a half-breed named Cyprian Morin, has raised barley and

vegetables every year for twenty years, and has eighty head of cattle and thirty-five horses.

The beautiful valley of the Clearwater River, near the 57th parallel is covered with pea vine, vetch, red-top, and upland hay, growing in profusion. It will, in Mr. Crean's opinion, make a magnificent cattle range and farming country. There are large open prairies, the grass is fine and the soil is a good loam, with a sandy clay subsoil. When the railroad now planned reaches McMurray on the Athabaska, there is no doubt that a large agricultural settlement will take possession of this fine valley.

The statements here reproduced from Mr. Crean's report are sufficient to show that, in all probability, Canada has a large reserve for settlement in the territory to the north of the lands now surveyed in Alberta and Saskatchewan. Before many years this great region will have steam connections with the settled regions to the south, and then the utilization of the northern territory will begin. There is little doubt that in the near future this part of Canada will be the home of thousands of farmers and stock raisers.

NOTES ON THE DESCRIPTION OF LAND FORMS.—IV.

WELLINGTON HARBOR, NEW ZEALAND. By what method can a scientific observer who has seen and studied a certain district give the best account of it to a scientific reader who has not seen it? The method followed in some essays is to begin with an empirical description of the observed facts, arranged in order of their distribution and phrased in popular language, and then on a later page, after some account of the geology of the district has been given, to present the geographical facts again, but this time in genetic order and in technical, explanatory phrase. Yet the very author who follows this two-fold method in his geographical presentation may in the same essay introduce his geological matter immediately in thoroughly technical style. Perhaps the reason for the adoption of methods so unlike for the two sciences is a semi-conscious feeling that geography is not yet ripe for so advanced a treatment as is proper in geology; that geographical descriptions must be at least introduced in an empirical and popular form, even if they are intended for readers who can at once understand geological technicalities, and who can on a later page than the first understand geographical technicalities also.

Anyone who has had experience in discussing problems of this kind with geographical authors differing in temperament and training must know that

preferences as to method and style vary over a wide range. It is probable that some readers of these notes will prefer, even in articles for trained readers of scientific journals, that geographical presentation should be made in the two-fold method, first empirical and then, after some geological pages, explanatory; they may not approve of the more direct method which introduces explanations promptly at the beginning, by giving as terse and technical an explanatory outline of the whole story as is consistent with ready reading, and then devoting to the presentation of additional details the space that the other method occupies with duplicate statements.

While I have no desire to conceal my own preference for direct and technical presentation in scientific journals—whatever other methods may be preferred for elementary schools or for popular lectures—it is not at all my wish to imply that there is anything like a right or wrong way of proceeding; nor is the least my intention to impugn the value of the results presented in the two-fold method. The matter that I wish to place before the readers of the *BULLETIN* is that conscious and intentional experiments should be made in the use of various methods of description before any one method is adopted; and that the best one of many possible methods should be then selected for use, always with due consideration of the space at the author's disposal and of the class of readers addressed. If conscious experiment of this kind is not made, the writer's preference may be based on habit accidentally formed before acquaintance was gained with various alternative methods, rather than on careful choice after abundant trial. It is the making of an open-minded choice of method that is here urged. Only after such choice is made should habit be formed.

In order to give specific illustration of the question at issue as regards the two-fold and the direct method of geographical description, I may cite an article on "The Physiography of Wellington Harbor," by my friend, J. M. Bell, Director of the Geological Survey of New Zealand (*Trans. N. Z. Inst.*, xlii, 1909, 534-540). The article bears internal evidence of being based on careful observation from which well considered theoretical conclusions are derived, and after one has read it through a clear picture of an interesting district is gained. There can hardly be two opinions on these points, although as the article is unfortunately only six pages long, there is not space enough for the full presentation of all the facts on which the conclusions are grounded. The value of the article is evident. The question here raised concerns only the kind of presentation from which the mature geographical reader shall most readily acquire a clear understanding of the district that is treated. Its chief conclusions are as follows:

Wellington Harbor—or Port Nicholson as it is often called—is a land-locked body of water, measuring nine miles north and south by five miles east and west, which opens southward at the southern end of the northern island of

New Zealand. It results from the irregular displacement of several north-south fault blocks, the fragments of an extensive peneplain that had, in an earlier cycle of erosion, been worn down on folded argillites and grauwackes. The uplifted blocks, now maturely dissected and in some places subdued, form ridges and highlands on the east, north and west. The depressed and submerged blocks determine the irregular area of the harbor. The eastern border is comparatively simple, as if it followed a nearly straight scarp between the uplifted and depressed areas. The harbor mouth is narrowed to a mile on the southeast by the non-submerged southern part of two western ridge-blocks which farther north dip under water; thus the inner harbor gains its full width of five miles; but it is here and there interrupted by islets and shoals, as if the depressed blocks were incompletely drowned. The eastern one of the two ridges by which the harbor mouth is narrowed seems at first to have been an island, but it is now attached to its western neighbor by a sand isthmus which divides what was originally a second entrance to the harbor into a short outer and a longer inner bay. The oblique inner or northwestern border of the harbor is the scarp of a northeast-southwest master fault, still so steep and so little dissected that the streams from the highland have not yet incised their narrow gorges to its base; below the gorge mouths the streams plunge down in abrupt water-faults. [It is here to be regretted that the narrow limits of the article excluded statement of the relation between the strike of the folded strata and the trend of the inferred master fault, for in case these two directions diverge the evidence of faulting would be much stronger than if they were parallel.] Since the time of displacement, the original northeastern extension of the harbor has been much reduced by the delta of Hutt river, which, broadening as it grew forward, has at present a frontal width of nearly two and one-half miles. In the same period, strong but immature sea cliffs have been cut on the southern slope of the exposed fault blocks along the outer coast; and less pronounced shore work has been done around the protected coast line of the harbor. Very recently a slight elevation, partly accomplished during the earthquake of 1855, has revealed a narrow strip of the marine platform forward from the cliffs of the outer coast, and has laid bare some flats well adapted for settlement around the border of the harbor. Wellington is partly built on one of these flats on the west, where the full width of the harbor is gained between the partly submerged blocks on the south and the scarp of the oblique master fault on the north.

Even without the aid of the outline map which accompanies the original article, the reader ought to gain a fairly good idea of Wellington harbor from this explanatory description, which is compiled from Bell's statement with a few changes of phraseology. Each element of the description suggests a definite and easily conceived form. A peneplain worn on folded argillites and grauwackes is readily pictured. The divisions of the peneplain into fault blocks,

généralement trending north and south, and the displacement of the blocks in a specified manner, with the resulting submergence of the harbor area, offer no difficulty of understanding. The mature dissection of the uplifted blocks is very readily imagined. The filling of part of the harbor area by the forward growth of Hutt river delta, the carving of great and small sea cliffs on the outer and inner coast lines, and the building of a sand isthmus between the partly submerged ridges are additional consequences of normal and marine agencies in the cycle of erosion introduced by the displacement. The revelation of the wave-cut platform in front of the outer cliffs and of flats around the harbor border is a simple result of recent elevation. [No mention is made of terraces in the delta.] All of this explanatory matter is indeed so plain that one may understand it at the first reading; but it is from the later, not from the earlier, pages of Bell's paper that the explanatory statements are taken. If we omit certain local details and local names, and paraphrase a few words, his first page reads as follows:

"The harbor is a fine sheet of water about nine miles long by five miles wide, land locked save at a comparatively narrow entrance. . . . A number of islets and two small islands . . . appear on its surface, while several shoals . . . render navigation somewhat difficult in places. High hills almost completely surround the harbor, rising in general in steep slopes from the water's edge. There are, however, several fair sized areas and small patches of level or gradually sloping land close to the edge of the harbor. By far the largest of these is that which forms the relatively wide valley of the Hutt river, extending northeastwards from the northeastern end of the harbor. This plain has a width of nearly two miles and a half near the harbor, and gradually narrows as it extends inland. Westward from the narrow [entrance of the harbor] is a low range of hills. . . . These are connected with . . . [a second range of] hills, to the west, by a narrow sand isthmus between . . . and . . . bays. The [hills of the second range] . . . attain their maximum altitude in Mt. . . . which rises some 648 ft. above the sea. To their westward is the low and relatively flat land on which the city of Wellington stands, having a slope on the northern side to the harbor and on the southern side to . . . bay. Westward of the city rise the . . . hills. These are partially separated by the . . . valley from the main range of hills extending northeastwards along the edge of the harbor and bordering the Hutt valley to the westward. A view from any prominent position on the hills around . . . [the harbor] discloses an elevated country stretching in all directions, broken by narrow valleys and deep ravines. If this elevated country be viewed from a point on the eastern side of the harbor, one is struck with the general uniformity in height attained by the crests of the various hills on the west side. Since this even skyline is quite independent of the structure of the country rocks, which consist of highly folded and shattered argillites and grauwackes, it apparently exhibits an elevated plain of erosion, or peneplain."

Only after this empirical introduction do we find in three and one-half pages, devoted partly to geological history, partly to physiographic evolution, the statements from which the explanatory account of the harbor as given above is condensed. The local names of various hills and bays are omitted above, in order to emphasize the fact that they have no descriptive value whatever for a reader who does not know the district concerned.

The empirical quality of the introduction is maintained with remarkable faithfulness, even to treating forms so easily understood as a river delta and an island-tying sand isthmus in terms independent of their manifest origin. But is it helpful to the mature reader to proceed so cautiously? Is it really worth while to be so deliberate as to allow three pages of text to intervene between the empirical statement of immediately observable facts regarding a delta and a sand isthmus, and the simple explanation of their origin. Is it desirable to insert nearly a page of geological history between the empirical description of the harbor and the explanatory account of it as a submerged graben? In answering these questions the reader should bear in mind that, when the argillites and grauwackes are first mentioned, their present condition is described at once in explanatory fashion by the phrase, "highly folded and shattered"; that is, their deformed structure is presented not in empirical terms of direct observations, but in genetic terms that are indicative of the inferred processes, which, according to current geological theory, have produced it.

Again, such terms as anticline and syncline, paleozoic and mesozoic, are used without introduction, on the perfectly reasonable assumption that the readers to whom the article is addressed will immediately understand them. Yet so elementary a conception as a delta or a peneplain is approached empirically and inductively, as if it were unknown, or as if the interpretation that it implies were hazardous. There is perhaps an appearance of safety in an inductive presentation of this kind; but surely the manner in which a result is presented has nothing to do with its safety. That important quality depends on the care in observation and the skill in theorizing that were exercised during the investigation that precedes presentation. The correspondingly important quality in presentation is clearness, with which the deliberate pace of induction and the paraphrases of empirical description are not necessarily associated.

An experimental test of the relative efficiency of the two-fold and the direct methods may be made fairly well, if a geographical reader of these notes will ask some patient and geographically minded friend to listen while the empirical and the explanatory descriptions, as given above, are read to him; and then to express his opinion on the advantage of introducing the explanatory by the empirical statement, as compared with entering at once upon the explanatory statement: but the experiment can be better made if the geographically minded reader will try the two methods of procedure for himself, when he next has occasion to write an article of his own.

W. M. DAVIS.

GEOGRAPHICAL RECORD

THE AMERICAN GEOGRAPHICAL SOCIETY

MEETING OF THE SOCIETY. A regular meeting of the Society was held at the Engineering Societies' Building, No. 29 West Thirty-ninth St., on Tuesday evening, February 21st, 1911. Vice-President Greenough in the Chair.

The following persons were elected to Fellowship:

William Gould Brokaw,	J. G. Phelps Stokes,
Stephen Pearson Brown,	Charles C. Thain,
Frederick S. Dellenbaugh,	John Clark Udall,
William B. Dunning,	Paul M. Warburg,
Max Pam,	George H. Warner.

The Chairman then introduced Mrs. Charles Schaeffer who addressed the Society on "At the Sources of the Athabaska and Saskatchewan Rivers." For several years Mrs. Schaeffer has made long excursions among the Canadian Rockies to the north of the Canadian Pacific R.R. Her lecture related to the mountain system as far north as Mt. Robson, which has seldom been described and pictured for lecture audiences. The stereopticon views were superior and the large audience listened with great interest to Mrs. Schaeffer's discourse.

AMERICA

PROF. ELLSWORTH HUNTINGTON WILL RENEW HIS WORK IN THE SOUTHWEST. Prof. Huntington is going to the southwestern part of the country again this season as Research Associate of the Carnegie Institution, to continue the work of last year. His researches last season were confined chiefly to regions where archæologists had never done much and he now plans to visit some of the well-known ruins. He will spend a month or more in New Mexico, another in Arizona and then he proposes to go on to California for two or three months, to study the same problems there under quite different conditions.

EXPEDITION TO LOWER CALIFORNIA. The steamer *Albatross*, sailed from San Diego on Feb. 25, on a two months' collecting Expedition to Lower California. The American Museum of Natural History and the United States Bureau of Fisheries, are coöperating in the expedition. Dr. Charles H. Townsend, Acting Director of the Museum, commands it, and is accompanied by seven investigators and collectors. The work will begin with deep sea dredging to Guadalupe Island, 250 miles from San Diego extending to depths of two and a half miles. Mr. G. C. Bell of the American Museum will make molds of the various deep sea fishes and invertebrates as soon as collected. A fishery survey of the peninsula of Lower California will be made and there will also be work on shore. The peninsula will be studied on both coasts and the collectors will procure mammals, birds, reptiles and fishes, many of which are of special interest because they are peculiar to the locality.

GEOLOGICAL WORK ALONG THE SANTE FÉ R.R. A recent investigation of the geology of parts of West Central New Mexico and Central Arizona from Albu-

querque to the region west of the Grand Canyon of the Colorado has been carried on by N. H. Darton (*A Reconnaissance of Parts of Western New Mexico and Northern Arizona*, *Bull.* 435, U. S. Geol. Surv., 1910) in connection with the study of underground water. An interesting feature of this study is the detailed geological map (Pl. XVI) of part of the Grand Canyon showing, on Matthes' superior topographic map, the relation of the several resistant and weak rock strata to the cliffs and slopes of the canyon walls. The mapping of faults in the region emphasizes the fact that the main canyon is a stream valley, pure and simple, and absolutely independent of fault rifts. Several tributary canyons follow the general line of faults, but these are doubtless due to zones of weakness here rather than original fault cracks. The canyons of Bright Angel Creek and Garden Creek, the latter followed by the Cameron Trail from the Grand Canyon railway station to the Colorado river, follow a fault but are not otherwise different from the neighboring tributaries. The photographic illustrations in the report are superb. LAWRENCE MARTIN.

RELATION OF CLIMATE TO CRANBERRY GROWING. The cultivation of cranberries, mainly confined to Massachusetts, New Jersey, and Wisconsin, has climatic relationships which have recently been studied by H. J. Cox (*Frost and Temperature Conditions in the Cranberry Marshes of Wisconsin*, U. S. Dept. of Agric., Weather Bureau Bull. T, No. 443, 1910). The annual crop in Massachusetts is about 300,000 barrels, in New Jersey 150,000 and in Wisconsin 75,000; and in each state, where the cranberries are always raised on bottom lands, there is much danger from frost. If the cranberry lands are (a) drained, (b) sanded, or (c) cultivated, reducing leaf area, less heat is lost at night by radiation, more heat is gained during the daytime, and the danger from frost is reduced. Prediction of frost by Weather Bureau observers is of the greatest value to cranberry growers. LAWRENCE MARTIN.

ASSOCIATION OF AMERICAN GEOGRAPHERS. The seventh annual meeting was held at Pittsburg, Dec. 29-31. About twenty-five members were present and the attendance of members and non-members ranged from twenty-five to fifty. Twenty-five papers were read, not including those presented by title. The subject of President H. C. Cowles' address was: "The Causes of Vegetative Cycles." Evening lectures were given by Dr. Cowles on the subject "The Origin and Destiny of the Everglades" and by Prof. Mark Jefferson, on "Rocky Mountain Forms." A round table conference conducted by Prof. Rollin D. Salisbury of the University of Chicago upon the topic "The Purposes of Geographic Instruction and the Phases of the Subject best Adapted to these Purposes" was marked by strong interest and vigorous discussion.

The officers nominated for 1911, were duly elected and the full Council for the year is as follows: President, Ralph S. Tarr; First Vice-President, Alfred H. Brooks; Second Vice-President, Henry G. Bryant; Secretary, Albert Perry Brigham; Treasurer, Nevin M. Fenneman; Councillors; R. E. Dodge, W. M. Davis, Herbert E. Gregory.

The following were appointed delegates to the Tenth International Geographical Congress to be held in Rome, in October, 1911: W. M. Davis, H. C. Cowles, R. S. Tarr, H. W. Fairbanks, A. P. Brigham, and Cyrus C. Adams.

A. J. COLLIER. Mr. Collier, formerly connected with the U. S. Geological Survey, has accepted a position as head of the Department of Geology in the University of Oregon.

SOURCE OF THE AMAZON. In a paper by Dr. Wilhelm Sievers on his recent explorations among the Cordilleras of Ecuador and Peru, (*Zeitsch. of the Berlin Geogr. Soc.*, No. 8, 1910), he treats in detail of his work among the headwaters of the Marañon, which resulted in his determination, apparently, of the ultimate source of the Amazon. He says that the distinguished explorer Raimondi was mistaken when he announced the Nupe as the most important of the three rivers whose united waters form the Upper Marañon. Dr. Sievers found that the Lauicocha R. carries much more water, extends farther south, and is the greatest of the Marañon sources. He traced this river to its ultimate springs on a snow mountain called San Lorenzo in the Cordillera de Huayhuash and to the lagoons Santa Ana, Caballo Cocha, Anka Cocha and Tinki Cocha about 15,580 feet above sea level. Here the Lauicocha is born and its pure blue waters are rightly entitled to the distinction of being the ultimate source of the Amazon. Farther down the river, is Lake Lauicocha, which is designated on Peruvian maps as the head source of the Amazon, the fact being however, that the real source is nearly 100 miles to the southwest of this lake.

NITRATE RESOURCES OF CHILE. According to the *Mercurio* a leading newspaper of Santiago, Chile, there are 220 million tons of nitrate in government land that could be worked now. At the present rate of increase of the consumption it is calculated that this will last about sixty years; and taking into account the probable quantity of nitrate that remains still to be discovered, it is thought that there is a supply sufficient for at least 100 years.

DR. BRANNER GOING TO BRAZIL. Dr. J. C. Branner, Professor of Geology, at the Leland Stanford Jr. University, Cal., will start on April 15 with six assistants to explore the western part of the north coast of Brazil. The special object will be to determine how far the distribution of Brazilian fauna is affected by the obstruction of the Amazon River. The government of Brazil will provide the explorers with a gunboat.

AFRICA

CLIMATE AND RAINFALL OF SOUTH AFRICA. In the South African Supplement of the *London Times*, Nov. 5, 1910, Mr. R. T. A. Inness, Director of the Transvaal Observatory, has an excellent short paper on the climate and rainfall of South Africa. Over most of the territory about three-quarters of the rainfall comes in summer. On the other hand, there are notable exceptions. For example, over the Cape Peninsula and for some distance inland the chief rains occur in winter, and along a narrow strip of the southeast coast the rainfall is fairly equally distributed over the whole year. Immediately to the south of German Southwest Africa and some way north of the Cape Peninsula the country is practically rainless. At the principal towns of South Africa, where observations have been taken for the longest periods, the mean temperatures of the warmest month average between 68° and 77°; of the coldest month, between 47° and 65°; the absolute maxima range from 94° to 111°, and the absolute minima from 16° to 34°. The means for the year range between 59° and 72° at these same stations.

The High Veldt of the Transvaal and Orange Free State has an average summer rainfall of from 15 inches in the west to 25 inches in the east. The summer rainfall comes largely in the form of short, intense showers. In good

years the eastern half of the Union is visited by rains of a monsoonal type, and when these rains come over a succession of several years the water-level is raised, and lakes and "pans" are filled with water which will last throughout several dry seasons. There has recently been a dry period of some 20 years in this region, but the last two seasons' records seem to indicate a return to a wetter period. Thunderstorms and hail are very rare over the Cape Peninsula and district, but violent thunderstorms are frequent over the Transvaal and Orange Free State, where destructive hailstorms frequently do considerable damage.

The cloudiness is very small in amount, averaging but 31% over the Transvaal province. The soil dries quickly under the bright sunshine. During the day there is almost always a breeze, which dies down at sunset. The dry soil and the wind are together responsible for the dust, which is one of the disagreeable features of the climate. Snow is not uncommon in Basutoland and in parts of Cape Colony. At very rare intervals it falls in the Transvaal, as was the case in August, 1909, when 14 inches of snow fell in Johannesburg in 26 hours.

R. DEC. WARD.

THE SUEZ CANAL. The commercial movement through the Suez Canal in 1910, was 22,434,661 tons, of which 8,429,041 tons were carried from the Mediterranean to the Red Sea, and 14,005,620 tons from the Red Sea to the Mediterranean. The total tonnage through the Canal in 1910 was 2,510,483 larger than in 1909.

ASIA

BIRD MIGRATIONS AND WEATHER. Dr. W. R. Eckhardt (*Das Wetter*, 1910, No. 10) has been investigating the meteorological conditions of bird migration in Europe, with some interesting results. He finds that the general direction of migration of the birds over central Europe in spring is towards the northeast, while southerly winds are usually blowing at the earth's surface. This results from the fact that a cyclone over the British Isles produces a southerly wind in Germany, while above the surface, in accordance with the law of change of direction of cyclonic winds with altitude, the direction gradually changes more and more towards the west. The birds make use of this upper current in order to carry them towards the northeast, where their breeding grounds are situated. The fact, noted by many observers, that migrating birds often fly "against" the wind, or obliquely to the wind, thus finds simple explanation: they are migrating with the upper currents, which are not the same as those on the surface.

Observations of the temperatures of the free air made at Hamburg and Aachen during March 18-19, 1909, at the time of maximum bird migration, showed that the birds must, at that time of the year, almost always fly in air strata whose temperatures are below the freezing point. Pressure distribution seems to be the most important meteorological factor controlling bird migration. According to Marek the advances of barometric maxima from the north toward central and southern Europe are to be considered as the causes of the beginnings of the autumn migrations, while the advances of the sub-tropical high pressure area from the Azores or from the southeast are followed by the migrations of spring.

R. DEC. WARD.

POLAR

THE ZEPPELIN STUDY EXPEDITION TO SPITZBERGEN. The party led by Prince Henry of Prussia, which left Germany last season to make studies in Spitz-

bergen, that might help towards the practical participation of dirigible balloons in Polar exploration, returned safely home. Prof. E. von Drygalski, the commander of the German Antarctic Expedition on the *Gauss*, recently gave some facts concerning the work of the party at a meeting of the Berlin Geographical Society, (*Zeitschr.* of the Berlin Society, No. 10, 1910). Among other participants in the expedition were Count Zeppelin, Dr. Hergesell, the meteorologist, Prof. Reich, and other scientific men. The funds were provided chiefly by Privy Counselor Friedländer-Fuld, the North German Lloyd loaned the services of its steamer *Mainz* and Count Zeppelin, and the scientific staff planned the work. The Norwegian sealing vessel, *The Phoenix*, was engaged for ice navigation, and the yacht *Carmen* was taken along for in shore work. A captive balloon was part of the equipment.

Prof. von Drygalski says that one result of the trip is proof that the dirigible balloon can be brought down to the ice safely, and anchored quickly by an iron appliance, which was successfully tried with the Zeppelin balloon. It is believed the anchor would hold the balloon in the face of a severe windstorm, as it held fast in the ice, though heavy stress was brought to bear upon it, by means of the capstan of the *Mainz*.

Most of Prof. von Drygalski's paper is given to the general scientific work of the party, but he says he is free to declare that a number of fundamental facts and considerations of importance, in all attempts to use airships for exploration have been established.

The widely spread announcement that, encouraged by the success of these studies, a party will go to Spitzbergen and attempt in July next, to reach the North Pole by balloon, is evidently erroneous. Prof. von Drygalski announces that the entire party last year was convinced that no attempt for North Polar exploration should be permitted until the airship and especially its motor have become more safe and practical than they are now.

MR. LEFFINGWELL IN ALASKA. Mr. Ernest de K. Leffingwell, under date of Sept. 22, 1910, writes from his camp on Flaxman Island, having just returned from a three-weeks trip to the westward, in his yawl *Vega*. Though storm bound for several days, he was able to map the reef of islands as far as the Midways, twenty-seven in all, and fifteen miles of coast on the main land. Considerable difficulty was experienced, on the return, in crowding the vessel through the ice which was rapidly forming. At one point the boat grounded in shoal water, and the party had to wade and work in the ice water for half an hour to get off. The season had been very open. Two caribou were secured on the trip, besides a plentiful supply of walrus and seal meat for the dogs. Mr. Leffingwell's letter was brought by a party of Eskimos overland to Fort Yukon, where it was postmarked Jan. 16, 1911; it arrived in Pasadena, Cal., on Feb. 26. Letters are expected later by way of Herschel Island, by the dog sledge mail of the Northwest Royal Mounted Police.

The programme Mr. Leffingwell had in view at the close of the Mikkelsen-Leffingwell Expedition (*Bulletin*, 1907), included the exploration of the area north of the Yukon-Arctic divide, and between the Colville River, and the Canadian boundary. Four years (which have nearly drawn to a close) he estimated would be necessary for the accomplishment of his task. In the first two seasons Mr. Leffingwell's work included tidal observations for three months at Flaxman Island; the mapping of a portion of the coast and about 100 miles of traverse in the interior; observations for latitude, longitude, and azimuth;

geological observations, including collections of fossils, studies of the Eskimo vocabulary and grammar; and meteorological observations for a complete year. Mr. Leffingwell continued his survey of the coast between Herschel Island and Point Barrow. About fifty miles of the Canning River, opposite Flaxman Island were mapped and the geological work in that region was completed.

He now expects to survey the coast between the Colville River and Demarcation Point. Four longitudes were secured by occultation during the winter of 1909-10, in addition to the four previously worked out by the United States Coast and Geodetic Survey.

The explorer's address is Barrow, Alaska. He will go for his mail about Aug. 1, and two months should be allowed for letters to reach Barrow. Supplies are to be forwarded to Mr. Leffingwell, through the Pacific Net & Twine Co., Seattle, and packages reaching the Company by May 1, will be included in the cargo to Flaxman Island.

LIEUT. FILCHNER'S PLANS. This explorer reported in January to his financial Committee, in charge of the finances of his coming enterprise that he expected to start for the Antarctic from Hamburg this Spring, on his ship the *Deutschland*. He will make oceanographical observations across the Atlantic to Buenos Aires and expects to leave that city in October for Sandwich Island, from which, late in December, he will start across Weddell Sea, expecting to make his headquarters perhaps on Coats Land, but preferably on some still unknown land further south.

His ship will return to the Atlantic to pursue oceanographical researches, leaving at the station ten men who will spend the winter in scientific studies. Upon the dawn of the summer of 1912, four men will start on a sledge journey across the unknown Antarctic area. It is hoped, during the winter, to establish supply caches for a considerable distance on the route. The sledges will be drawn by Manchurian ponies. The distance from Coats Land, south of the Atlantic, to Ross Sea, south of the Pacific, is over 1,800 miles and unless Filchner is favored with unusual conditions of travel, he cannot make the journey in a single summer. It is more probable that he will be compelled to winter in South Victoria Land, perhaps at quarters established by the British Expeditions. Eight specialists will constitute the scientific staff. This expedition hopes, as a part of its work, to ascertain if the land mass is of continental extent or whether it is, in fact, an archipelago.

ICE IN ARCTIC SEAS IN 1910. The Annual published in Danish and English by the Danish Meteorological Institute, under the title "The State of the Ice in Arctic Seas," has appeared for 1910. As usual, it is prepared by Commander C. I. Hansen, who has collected the information from institutions, mariners, men of science and others, who were in touch with the Arctic last year.

Whalers in the Greenland Sea reached Lat. 80° N. as early as May, though at Angmagssalik, the Danish station about 15° further south, the ice lay close in shore all summer and it was not until September that the station was reached by a ship. The coasts of Iceland were almost ice-free. The conditions were very bad at Spitzbergen and navigation in Horn Sound and Bell Sound was very difficult. The winter ice in Barents Sea, north of Norway broke up early and it was reported that a vessel reached Franz Josef Land but soon had to retreat. The sea was open all winter along the southwestern coast of Novaya Zemlia. A great deal of ice from East Greenland rounded Cape Farewell and

blocked up the coast of Southwest Greenland as far north as Frederikshaab till the end of August. Hudson Strait and Bay were navigable in July, but the Bay did not become ice-free till August. Davis Strait and Baffin Bay were unusually free from ice. In April and May the ice limit in Bering Sea was farther south than usual. The conditions were normal in Beaufort Sea, to which our San Franciscan whalers resort, but were unfavorable along the coast of Northeast Siberia.

PHYSICAL GEOGRAPHY.

COMPARISON OF NORTH AMERICAN AND EUROPEAN GLACIAL DEPOSITS. American students of glacial deposits, especially those working in the Mississippi Valley, have divided the drift sheets into three or four divisions, interpreted as glacial stages separated by inter-glacial stages. The latest glacial stage is the Wisconsin preceded by the Illinoian, Kansan, and Pre-Kansan (or Nebraskan or Jerseyan). Four stages are also recognized in north Germany, the youngest being the young drift or upper Diluvian, preceded by the middle drift, the old drift or Saxonian, and the Scanian. In the Alps, Penck and Brückner have recognized the Würm, preceded by the Riss, Mindel and Günz.

Various attempts have been made at correlation of these different glacial stages of the two continents; but the most elaborate, as well as the most recent, is that by Leverett (*Zeitschr. für Gletscherk.*, Band iv, 1910, pp. 241-295 and 321-342). He is himself one of the chief students of the subject of differentiation of glacial deposits in America, and he spent "the year 1908 in western Europe in a study, which had for its aim a comparison and tentative correlation of the glacial deposits there with those of the United States, on the study of which he had been engaged since 1886." In his European studies Leverett was freely aided by a large number of the leading students of Pleistocene glaciation. Leverett admits that in spite of his long preparation in America and of his year's investigation in Europe, with the aid of a large number of eminent glacialists, "it would be presumptuous for one to pretend to clear up the matter of world-wide correlations of glacial deposits in a single year's study. . . . The full correlation, however, may in time be reached by repeated efforts of this sort."

The main body of Leverett's article consists of a detailed statement of the characteristics of deposits in different sections of Europe and America, and a discussion of the resemblances and the differences; and from this standpoint the article is one of very great importance and value to all students of Pleistocene glaciation, for it brings together, in summary, some of the main characteristics of deposits over a wide area and some of the main results of a great body of workers. The article closes with a series of paragraphs of summary and conclusions. He considers that there is little question of the correlation of the Nebraskan or Pre-Kansan drift with the Günz of the Alpine region. The second glacial stage, the Kansan, seems to correlate with the Mindel drift of the Alps, and the lower Diluvian of the North German lowland. The third glacial stage, called Illinoian in America, apparently has nothing that correlates with it in Europe, for the middle drift of the North German lowland and the Riss drift of the Alpine region, though representing the third glacial stage in these regions, each seems to be younger than the Illinoian drift. The Würm, Upper Diluvian, and Wisconsin drift seem to correlate fairly well. There are differences in detail, rendering some parts of this correlation less definite than one would ex-

pect. For instance, the Riss drift is more weathered than the loess-covered moraines of the Wisconsin drift and is doubtful as a possible equivalent of those moraines. The Würm drift correlates well with the loess-free moraines of America.

In his concluding paragraph Leverett says: "Although the variations in climate that give rise to glacial and interglacial stages seem to have been world-wide in scope there are not such close correspondence in glaciation in either widely separated or in adjacent fields as one might expect to find. Perhaps the most remarkable of all the discordances is that of the time of maximum extent of the adjacent Labrador and Keewatin fields in America. Why one field should have had its greatest extent in the second glacial stage and the other in the third is not apparent. It constitutes one of the leading problems for American glacialists. The meteorological conditions of the Ice Age are as yet but little known. When they are cleared up much light may be shed upon what now seems to be glacial eccentricities.

R. S. TARR.

ARCTIC TIDES. Dr. Rollin A. Harris, of the Coast and Geodetic Survey, has written a monograph ("Arctic Tides," 103 pp. and cotidal Map, Coast and Geodetic Survey, Washington, 1911) which brings together practically all available results pertaining to tides in Arctic waters. The work contains, in considerable detail, the remarkably accurate tidal observations along the northern coast of Grant Land and Greenland by the latest Peary Expedition as well as the observations at Flaxman Island and vicinity on the north coast of Alaska by the Mikkelsen and Leffingwell Expedition. The advantage of having all important tidal evidence in one publication is self-evident. In connection with the work, Dr. Harris has made numerous harmonic analyses and also expended much labor in unifying nonharmonic results from various sources. He says that, at the present time, observations are especially desired in the following regions or localities: the outer coast of Prince Patrick Island and Banks Land, the coasts of Mackenzie Province, the northwestern coast of Alaska, Wrangell Island and the Arctic coasts of Siberia.

Referring to Nansen's hypothesis that the unknown Polar region consists entirely of deep water, Dr. Harris considers that the decided westward drift observed by Mikkelsen and Leffingwell, off the northern coast of Alaska, is strong evidence against Nansen's faith in an unobstructed Polar Basin; and the westerly direction taken by the *Jeannette*, especially during the last five months of her drifting, does not suggest unobstructed deep water to the northward of East Siberia.

GLACIAL EROSION. In the last few years the writings in English upon the subject of glacial erosion have been mainly favoring the idea of extensive modification of topography by the erosive action of glaciers along lines of rapid movement. It is probably true that the great majority of glacialists are convinced that former, extensive glaciers have performed a vast amount of erosion. Not all, however, are convinced by the evidence, and among those who as yet remain unconvinced is Prof. E. J. Garwood, who, under the title of "Features of Alpine Scenery due to Glacial Protection," (*Geographical Journal*, Vol. 36, 1910, pp. 310-336) advances certain objections which he sees to the views of those who advocate extensive erosion, and puts forth a theory to account for phenomena that the majority of glacialists are assigning to glacial erosion. As the title indicates, his thesis is that ice is a protection rather than

an agent of destruction, and he applies his argument mainly to the Alps, with which he is intimately familiar, though drawing some illustrations from the Himalayas and Spitzbergen, which he has also studied.

The phenomenon of hanging valleys, considered proof of profound glacial erosion by the majority of glacialists, he assigns to the work of streams issuing from the front of a glacier and cutting out a gorge, which has later been enlarged, involving slight deepening and considerable broadening, by ice erosion during an advance of the glacier. With each recession of glacier ice during an interglacial period, gorge cutting proceeds below the glacier terminus while above it the ice in the valley is protecting the valley bottom from erosion; with each advance of the ice the interglacial gorge is broadened by glacial erosion. Garwood correlates with this set of conditions a series of steps present in certain glaciated valleys, interpreting these as indexes of the positions which the glacier front held during the interglacial times.

While the glacial erosionist will probably feel that the argument is incomplete, in the first place in assigning to interglacial gorge formation far too much work, and in the author's failing clearly to see the evidence of differential ice erosion in the valley steps which puzzle him, one cannot but be impressed by the serious attempt to understand a difficult problem and to meet objections to the current theory which have appealed to him. The fairness with which Professor Garwood has approached the problem is clearly indicated by the paragraph with which he concludes his article, which reads as follows:

"The foregoing account is an attempt to show how certain features in the Alps may have arisen on the assumption that ice erodes less rapidly than other denuding agents, and may consequently be protective. It is, of course, possible that under certain other conditions ice may erode more vigorously than water; if so, then the results would naturally be reversed. Can it be possible that we meet with both these conditions even in the same district, perhaps even in the same valley? Can it be that in the higher valleys and slopes, ice has exerted a relatively protective influence, while in the lower portions of the valleys where many large affluents coalesced in a single valley, glacial excavation has been more vigorous. If this should be so, it will explain the different interpretations which different observers have placed on the facts they have observed. Further detailed observation alone will show."

R. S. TARR.

GENERAL.

FRENCH GEOGRAPHICAL CONGRESS. The 30th National Congress of the French Geographical Societies will open at Roubait on July 29, for a week. Prince Roland Bonaparte will be President. Special attention will be given to physical geography, anthropogeography, and to France and her colonies. Dr. Charles Droulers, President of the Commission of Organization, has sent a circular to foreign geographical societies inviting their members to prepare papers for the Congress. The latest date for the receipt of such communications is July 1 prox.

MAPS FOR AERONAUTS. The French have taken up the subject of preparing maps for the use of aeronauts. A sub-committee of the "Permanent Committee" on aerial navigation has been appointed to study the air ship maps in use, the various projects for their improvement and to evolve an experimental map.

Germany has been inviting attention to this subject for about two years. It was a feature of the German Geographical Congress at Lübeck in June, 1909. It was discussed by geographers, cartographers and aeronauts at the Berlin Airship Conference in November of that year and the Map Commission of the German Airship Union has been studying the question of the cartographic needs of aeronauts and how best to meet them. *Petermanns Mitteilungen* and other periodicals have published a number of experimental maps.

Some conclusions seem to have been reached as to essential features of an airship map. The topographical sheets of the European countries are regarded as an adequate basis upon which to impose or emphasize the information required. It is generally thought that the map scale should be three miles to an inch. Churches, steeples, castles, towers and other landmarks should be made especially conspicuous as also, rivers, railroads and settlements. Figures of the elevation of the highest points should be marked in red figures. Conspicuous colors should be used as warnings, showing, for example the position of telegraph lines and other impediments to landing. The location of repair shops and other special information needed by the navigator must be given graphically so that their meaning may easily and quickly be grasped.

OBITUARY.

DR. ALEXANDRE SCHENK. Dr. Schenk, professor of anthropology at the University of Lausanne, Switzerland, is dead at the age of 36 years. The *Bulletin de la Soc. Neuchateloise de Géogr.*, for 1909-1910, contains the third part of Dr. Schenk's "Étude sur l'Anthropologie de la Suisse," the first two parts having appeared in the two preceding volumes. At the time of his death the fourth and concluding part of the work was in preparation.

GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY)

BOOK REVIEWS AND NOTICES

AFRICA

African Game Trails. An Account of the African Wanderings of an American Hunter-Naturalist. By Theodore Roosevelt. xv and 529 pp., map, illustrations, 5 appendices and index. Charles Scribner's Sons, New York, 1910. \$4.

Colonel Roosevelt's book, even if he had enjoyed only the ordinary opportunities of the Nimrod to hear, see and collect information, would easily stand in the forefront of books of its class. But exceptional opportunities of all kinds were his, and he utilized them fully to fill his pages with good, profitable reading. These advantages coupled with the literary quality of his pages has resulted in one of the great works of its kind. He has also given the best account of the fauna of Tropical Africa that has appeared in a work for popular perusal. He had the advantage, furthermore, of ample scientific assistance in the field, so that his museum collections are very large and his appendices, giving lists of the fauna collected, including descriptions of the habitat of many species, and an account of the biological survey of Mt. Kenia, are very desirable additions to African literature. In Appendix E, Col. Roosevelt presents many facts that tend to discredit the theory of protective colorization. The author, as well as many other travellers, has faith in the future of British East Africa. He writes (p. 373):

"The highlands of East Africa form a white man's country, and the prime need is to build up a large, healthy population of true white settlers, white homemakers, who shall take the land as an inheritance for their children's children. Uganda can never be this kind of white man's country; and although planters and merchants of the right type can undoubtedly do well there—to the advantage of the country as well as of themselves—it must remain essentially a black man's country, and the chief task of the officials of the intrusive and masterful race must be to bring forward the natives, to train them, and above all to help them train themselves, so that they may advance in industry, in learning, in morality, in capacity for self-government."

The Union of South Africa. By The Hon. R. H. Brand, Secretary to the Transvaal Delegates at the South African National Convention. 192 pp., including in the Appendix The South African Act of 1909. Clarendon Press, 1909.

The birth of a new State can never fail to be an event of interest. For some years we have had our attention especially directed to the social, political and economic affairs of South Africa. We were all more or less interested in reading the stories of the trekking Boers and the aggressive English, which stories concluded with the inevitable British victory. But the war ended, what

next? The Hon. R. H. Brand, who has been familiar with the situation for some years, holding position in the public service of the Transvaal and Orange River Colony, as he tells us, and serving as secretary to the Transvaal delegates at the South African National Convention which shaped the constitution of the New South African Union, would appear to be a person likely to be well informed; one who could write with something like authority on "The Union of South Africa." He concludes the preface to his book however, by stating that the opinions expressed are purely personal. We are reminded of our own early constitutional convention when he tells us that this "convention sat with closed doors, and secrecy is still maintained as to its proceedings."

For the student of political institutions, in particular of constitutional conventions, the book is certain to be considered one of striking interest. The author has very successfully shown how marvelous has been the adjustment and assimilation of interests in South Africa since the Boer war. South African politics, "always kaleidoscopic," as he says, have never presented so astonishing a picture as that which makes up the subject matter of his book. In an "Historical" chapter the author calls attention to the attempts made to form a union prior to the one of which he writes, and to the difficulties which have stood in the way, chiefly economic, added to which is what he terms "the native question." The composition of the convention as to membership is explained, and the most important questions which came up for consideration in the same are noted.

In the adjustment of details, it is an interesting fact that Pretoria is fixed as the seat of government, that is, of the executive, and Cape Town as the seat of the Legislature, and the advantages and disadvantages of the plan receive consideration by the author. The questions of the executive, legislative, and judiciary department of provincial constitutions, of the relation of the mixed racial conditions to the new government, of future policies, and of the relation of South Africa to the Empire, are all interestingly presented.

E. L. STEVENSON.

Arts and Crafts of Ancient Egypt. By W. M. Flinders Petrie. xvi and 158 pp., 140 illustrations. A. C. McClurg & Co., Chicago, 1910. \$1.75.

A work on Egyptology by Prof. Petrie, needs no endorsement. His present hand-book was written to aid in the understanding of Egyptian art, and the treatment keeps that purpose steadily in view; so that the book is different from others in which Prof. Petrie has given the history of Egyptian art or the origins and connections of the art in each age. The work will be very valuable to those who wish to know better what Egyptian art is and to give it intelligent appreciation.

Die Fischerei an der Westküste Süd-Afrikas. Bericht über Untersuchungen an der Deutsch-S-W-Afrikanischen Küste und am Kap der Guten Hoffnung. 57 pp., 9 illustrations, and maps. Verlag von Otto Salle, Berlin, 1907.

Gives detailed results of study of the fisheries and guano fields along the coast of German Southwest Africa; the extent of the fisheries, mainland districts best adapted for centers of the fishing industry, climatic conditions, preparation of the fish for market and organization of fisheries interests. The plates show a number of the leading commercial fish.

ASIA

L'Inde. Sa Condition actuelle. A propos du Cinquantenaire de son incorporation au domaine de la Couronne britannique. Par Édouard Clavery. vii and 107 pp. Berger-Levrault & Cie., Paris, 1910.

The author describes concisely the present material condition of India, the distribution of its population among important occupations, the extent of mineral production, the facilities for transportation, the educational system and its results, the agricultural output, and the commercial relations with other countries. A list of important Hindoo terms and a bibliography conclude the work. The writer is in sympathy with the work of the United Kingdom in the Peninsula and regards it as conferring lasting benefits upon the people.

L'Inde Britannique. Société indigène—Politique indigène. les Idées directrices. Par Joseph Chailley. xvi and 513 pp. and index. Large 8vo. Armand Colin, Paris, 1910. Fr. 10.

This study of India is devoted especially to her social, political and administrative problems. The ~~great~~ difficulty in discussing these problems lies in the composite character of her population which, though sometimes ~~wrongly~~ taken for a nation, has never been one and consists, ~~to this day~~, of about 43 ~~different~~ races and nationalities, with 147 ~~different~~ languages and idioms. The religious divisions, ~~although not so numerous~~, add to the complexity of the situation, and as the different creeds in India mean, ~~not only religious, but also~~ social, organizations, it is as difficult to pronounce opinions on India as a whole as it is to propose any ~~universal~~ solution of her problems.

The most tangible expression, and at the same time the most successful ally, of this national segregation, is the caste system. The author denounces it as the most powerful obstacle to progress ~~along any line whatever~~. Missionaries and secular reformers ~~alike~~ would find their work half done if, ~~this system only~~ were removed. As in the days of old, it is ~~to a large degree~~ the lower classes who accept the new faith that places them in a more dignified position with regard to the deity as well as their fellowmen; hence converts of the upper classes irremediably lose caste by the contact, and association with them in the missions. In the mission schools every pupil ~~endowed with the necessary intelligence~~ receives the same instruction regardless of caste distinctions, and ~~therefore~~ the Christian element represents, to a certain extent, the intellectual élite of the country. But owing to the low social standing of the majority of the pupils, the actual influence of the graduates, though all of them advocates of reform and progress, is even smaller than the, already, small percentage of the population which they represent. In Madras, for example, the Christians are 2.7 per cent. of the total population, while among those who attend school, 6 per cent. of the men and 26.5 per cent. of the women pupils are Christians. Among the high caste Christians the position of the women is especially deplorable. Separated from the rest of their race by their different convictions, and from those who share their convictions by their different race, their isolation is equal only to that of the educated negro between the two races in the United States. For the caste, not India, is the real fatherland of the Hindoo. A person not belonging to any caste is not a respectable person. To be Hindoo, means to belong to a caste, and "Out-Castes" there are none because those not belonging to any particular caste will, by this very characteristic, be a caste by

themselves, though it be the lowest of all. Though often denounced and attacked, the system stands unshaken to-day as it was generations ago; on the contrary, new castes are continually forming wherever a group of people wish to give themselves special distinction, and the adversaries of the system are obliged, one after the other, to declare themselves defeated. The only class that might really do something in the matter, the native princes, stand by in perfect indifference.

Yet the institution is not so very old. The author proves its origin to be younger than the Vedas because no mention is made of it in them. It seems to have been introduced after the Aryan conquest, perhaps in imitation of the Persian social scale of priests. Warriors, farmers, and artisans, subsequent to a conflict between the priests and warriors of India in the course of which the priests, being victorious, saw the advantages of a privileged social position like that of their Persian colleagues, and introduced a similar gradation of the different professions in their own country, with themselves, of course, at the head of the list. Their example, in its turn, influenced the other classes to organize in a similar way, until every profession had drawn a Chinese wall around all those belonging to it. In other cases, the question of blood must have a share in the process. Aryan blood, being that of the conquerors, was considered a mark of distinction and in order to preserve its purity intermarriage with the native population was forbidden. In the north, where the main body of the Aryans had settled, the precept was easy to follow; but in the south, which was subjected by conquering expeditions from the north made up almost exclusively of men, its enforcement was, at first at least, impossible, and the Aryan men had to take Dravidian wives in order to preserve the race at all. But as soon as the permanency of the race was secured, the principle of seclusion was again put in force, and the line was strictly drawn between those who, while not full blood Aryans, had at least some Aryan blood in their veins, and those who had not. The respective amount of importance given to the question of blood in the north and south speaks in favor of this theory; for in the north, it is made less of than in the south: e. g. where purity of blood is a matter of course, it loses some of its value as a distinction; where it is less frequent, it is correspondingly more valued.

In the educational and administrative problems, too, race, caste, and religion combine to make the path of the reformer anything but smooth. To conduct public schools, for instance, is next to impossible in such a caste-ridden country; for, however non-sectarian and non-political, the school cannot be non-caste; it may ignore caste differences, but that will not secure it against caste influences, and it will only be the children of the liberal minority who attend it. The foreign character of the higher grades of teaching adds to the difficulties of the situation. The adoption of a sound administrative policy encounters other difficulties in its turn through the racial jealousies especially of the Hindoos and the Mohammedans. Of these two groups, the former constitute the pensive and scholarly, the latter, the active and statesmanly element. Owing to the introduction of the civil service system, for whose examinations the Hindoos are, of course, the better gifted party, the latter hold a number of important positions which is not only disproportionate to their number, but also to their administrative talents. While the Mohammedans, who are the better leaders, have comparatively few chances for leadership owing to their aversion to tests by competitive examinations.

While the book is, in the first place, a political and sociological study, it is incidentally also of great interest to the geographer through these manifold ways in which ethnological conditions are shown to influence the march of affairs. For this reason it may almost be called a geography of man in India, and it ought to be found by many a valuable supplement to the current books of a more strictly geographical character on that interesting country.

MARTHA K. GENTHE.

Tramps in Dark Mongolia. By John Hedley, F.R.G.S. xii and 348 pp., illustrations and map. T. Fisher Unwin, London, 1910. 12s. 6d.

The wanderings of Mr. Hedley, were really within the confines of China proper, as they were in the northeast of the Pechili Province, north of the Great Wall and of the railroad from Tien-tsin to Kin-tshou. Most of the region, however, is quite inaccessible and almost unknown and he has given an interesting account of this great district which is blessed with rich resources and destined some day to be important. Mr. Hedley is a missionary who in his trips was able to converse with all classes of people in their own language and thus he secured a great variety of information concerning their mode of living and general customs, which are believed to be now about what they were a thousand years before the Christian era. Studying both Christians and Mongols on the borderland where the two races meet he found that their Government is very bad, that the authorities at Peking give little attention to their well-being and that brigands and oppression are wide-spread. He believes that in the course of the development of minerals and railroads, prosperity will come to this outlying part of China, which has great possibilities of growth and enrichment. One of the advantages of the book is that this earnest missionary is well informed as to the history of the country and its people, so that he tells us what has happened at various places and correlates the landscape with the events that once influenced half the world. The book fills most adequately a gap in our acquaintance with China.

Tent Life in Siberia. Adventures among the Koraks and other tribes in Kamchatka and Northern Asia. By George Kennan. xix and 482 pp., 32 illustrations and maps. G. P. Putnam's Sons, New York, 1910. \$2.50.

This is the book that made Mr. Kennan well known in 1870, when it was published. In the forty years since then the book has never been out of print, nor ceased to find readers. This long demand has encouraged the author to issue a revised, illustrated and much enlarged edition. The present volume contains over 15,000 words of new matter, including the incidents and adventures of a winter journey overland from the Okhotsk Sea to the Volga River, a sleigh ride of more than 5,000 miles. A large number of the views are from photographs taken by recent explorers.

Studies in Galilee. By Ernest W. Gurney Masterman. With a preface by George Adam Smith. xv and 154 pp., maps and 32 illustrations. University of Chicago Press, Chicago, 1909. \$1.

Dr. Masterman is familiar with Galilee, has labored for sixteen years or so in the East and his papers on the history and geography of the Holy Land are regarded as authoritative. Few scholars have his knowledge of the recent history of Palestine and of the life of its people. Geographers will be interested to know that in these pages they will find a lucid account of the Galilee of to-

day, of the character of its inhabitants, of the industries in which they are engaged and of the position in history that the country occupies. His work also includes discussions of disputed opinions as to the position of localities or objects mentioned in ancient history and descriptions of many of the ancient ruins.

Across Yunnan. A Journey of Surprises, including an Account of the Remarkable French Railway Line now completed to Yunnan-fu. By Archibald Little. 164 p., map and 16 illustrations. Sampson Low, Marston & Co., Ltd., London, 1910. 3s. 6d.

Yunnan, until recently the least-known part of China proper, is coming more and more into notice. We have now two good books in English on this western province. Major Davies published an exceptional work on Yunnan (*Bull.* 1909, p. 651), which was the record of four journeys in the province to ascertain the feasibility of constructing a railroad between India and the Yangtse river. The present work was originally written by Mr. Little as letters to the *North China Herald*. This traveller and author died before his letters were prepared for publication and his book has been edited by his wife. Mr. Little was well known for his long travels in China and his vivid and painstaking descriptions of what he saw and heard. His last book contains the first extended description written in English of Yunnan from the Tonkin border to the Yangtse river; also much information about the French railroad from Hanoi to Yunnan-fu opened last year.

AUSTRALASIA AND POLYNESIA

Hawaii and its Volcanoes. By Charles H. Hitchcock, LL.D. viii and 314 pp., 68 plates, including maps, and index. Large 8vo. The Hawaiian Gazette Company, Honolulu, 1909. \$2.

The object of this book is "to describe correctly the phenomena connected with the discharges of molten lava from the two great Hawaiian volcanoes." For this purpose the author has collected and published (—or re-published, as the case may be—) the records of the known visits to those volcanoes from the early explorers to modern tourists. These records constitute 206 out of 289 text pages of the book. They are preceded by a chapter on the physiography of the Hawaiian archipelago, and followed by another on the Hawaiian type of volcanic action; an appendix of 15 more pages forms the conclusion.

It may be questioned whether it was necessary to devote such a large part of the book to the collection of all that testimony, most of which has been published before in scientific and other magazines. In this, their original form, they have an actual interest only for the scientist, as raw material for the study of vulcanism; to him however, they have, with few exceptions, long been accessible, and he would care less for a chance to possess them in book form than for the conclusions Mr. Hitchcock derives from them. The lay reader, on the other hand, can hardly be expected to have that scholarly interest in the matter that will enable him to read over again and again descriptions of pretty much the same story with all their unavoidable repetition, and will, in his turn, skip the larger part of this matter in order to get to the Professor's opinions on it. With a few exceptions, therefore, among which the diary of the botanist of Vancouver's expedition, Archibald Menzies, deserves especial mention, this, by far the largest, part of the book seems a rather superfluous ballast which only serves to make the book more bulky and, consequently, more expensive.

When one buys a book on Hawaii by a noted scientist it is the observations

and opinions of the author that he wants to obtain, not those of several dozen of miscellaneous and, to him, unknown observers. In its present shape, the book ought to have another title; but it might be preferable, after all, to omit most of parts 2 and 3, and let the book be true to its name: "Hawaii and its Volcanoes, by Prof. Hitchcock." As things are, the author's part of the work is limited to parts 1, 4, and the appendix, which is a little less than one-third of the whole book. Physiographically he distinguishes two classes of islands in the archipelago; the Low and the High, and the latter he subdivides into the "Lowest (e. g. uninhabited) of the High Islands," or those that do not rise more than 1,000 ft. above sea level, and the "High Inhabited Islands," or those above 1,000 ft. high. They all seem to rest on a submarine foundation of tertiary limestone which is traversed by eruptives.

Those called low are either swept by the waves in time of storms, or are simply reefs or shoals. They are partly sandy, partly shrubby; among them Laysan Island is noted for its birds and guano. The same is true of Nihoa, among the Lowest of the High Islands. Among the High Islands, Niihau is one great sheep ranch which has, during the last forty years, been in possession of one white family; and it is worthy of note that, in spite of the absence of any oppression of the, originally, 1,000 natives of the island, they have dwindled away under the contact of Eastern civilization just like their cousins on the continents, until there are now less than 200 of them left. Kauai is renowned for its good soil which has made it the "Garden Island" of the archipelago. It seems to be the oldest of the islands because its flora is the richest and most individual in species of any on the islands, and it is also celebrated for its agate shells of which there are over 200 species with 800 or 1,000 varieties, each of which is confined to a small section of territory, so that the most widely divergent forms are found in the valleys most distant from each other. Oahu and Maui are doublet islands formed each by two volcanoes whose districts have been connected by more recent necks; and Hawaii is, likewise, the product of her five volcanoes, of which two are still active. It is on these that the author establishes the Hawaiian type of vulcanism as characterized by a caldera, basalt, the most easily fused of all volcanic rocks, the development of an ascensive column from whose summit lakes of molten lava accumulate and flow away intermittently, a sympathetic uprising in adjacent calderas, the building up of domes rather than cones from material forced up from below by subterranean power, magnificent fountains of fire, and usually by rather quiet eruptions and few earthquakes, (p. 286). This definition is, however, not based solely upon the contents of this book, as descriptions of the "Hawaiian type" which agree almost literally with this have found their way already into foreign textbooks of geology.

In the last chapter the author touches upon the similarities of the Hawaiian and Lunar volcanoes, as demonstrated by Prof. Pickering, but without getting beyond the statement that "it is not practicable to set forth farther the similarities between the Lunar and Hawaiian volcanic features.

MARTHA K. GENTHE.

The Official Guide of Western Australia. 256 pp., and many illustrations. Second Edition. E. S. Wigg & Son, Perth, Dec., 1909.

A folio containing historical, geographical and economic information about Western Australia, copiously illustrated, and with many advertisements bound in with the text. Useful to those who contemplate settling in the State and for general reference.

Forschungsreise S.M.S. Planet, 1906-7: I. Band, Reisebeschreibung. xviii and 104 pp., ills., and map; II. Band, Aerologie. 124 pp., and 3 maps. III. Band, Ozeanographie. Von Dr. W. Brennecke. vii and 153 pp. With separate volume of diagrams, charts and photo-engravings; IV. Band, Biologie; Von Dr. Gräf. v and 198 pp., ills., and map; V. Band, Anthropologie und Ethnographie. Beobachtungen und Studien. Von Prof. Dr. A. Krämer. x and 152 pp. and ills. Anhang: Noten zu den phonographischen Melodien aus Madagaskar und Indonesien. Herausgegeben vom Reichs-Marine-Amt. Verlag von Karl Siegmund, Berlin, 1909.

The official account of the results of the first two years (1906-1907) of the German exploring ship *Planet*, in the Atlantic, Indian and Pacific Oceans. The work of this government vessel is still in progress. These volumes are not only the record of scientific studies in the fields of meteorology, oceanography, biology, and anthropology, but also give details of the processes of investigation and discussions relating to the instruments used. The volumes are rich in material for the study of specialists in these branches of science. Many tables accompany the descriptive details.

EUROPE

Die Oberflächengestaltung des norddeutschen Flachlandes. Auf geologischer Grundlage dargestellt von Prof. Dr. Felix Wahnschaffe. Dritte, neu bearbeitete und vermehrte Auflage. viii and 405 pp., 24 plates including maps, 39 text illustrations and index. 8vo. J. Engelhorn, Stuttgart, 1909. M. 10.

From a modest little volume in the series "Forschungen zur deutschen Landes- und Volkskunde" this study of the surface forms of Northern Germany has grown to a book of the respectable size of almost 400 pages. Such an increase means, of course, besides the regular bringing-up-to-date of the text, a complete change in the character of the book which, from one among many others, is now considered more or less "the" book on the subject. In its present form it is, indeed, not only a study of special (very special!) German geology, but owing to the pre-eminently glacial origin of the surface forms of the country, it is at the same time a treatise on the most important problems of glaciation, as illustrated in the surface forms of northern Germany, and for this reason it has a more than local importance and will be found a comprehensive and trustworthy reference on these phenomena also by the geologist who is not especially interested in German local geology.

The author discusses, first the relation between the bedrock and the present surface forms; secondly, the influence of glacial and, thirdly, that of postglacial, processes on the same. It appears that the influence of the older formations on the surface forms has been much overestimated. The latter reflect only the most general features of the structure of the former while the surface detail is, as a rule, quite independent of them. The palæozoic and mesozoic rocks, heavily dislocated at various times and further reduced by the effects of erosion and denudation, rarely rise, island-like, out of the younger sediments, and while they often form the foundation of small isolated hills, have nothing to do with the general topography of the country.

Glaciation alone can be made responsible for the latter, which is determined both by the deposit of moraine material and the hollowing out of basins and

troughs, and, during the retreat of the ice, the formation of the great quaternary river and valley systems. It is their deposits that have brought the country into undeserved disrepute because, being almost level, these old river beds determined the layout of the railroads which, therefore avoid almost all the picturesque parts of the country and give the traveller the impression that northern Germany is one continuous waste of sand.

The surface forms which were left after the retreat of the ice and the great rivers were not much modified in postglacial times because erosion and weathering have not yet been long enough at work. The only changes which have influenced the landscape since are the filling in of depressions left by the ice and the upbuilding, or destruction, of the coasts.

M. K. GENTHE.

A Concise Dictionary of Old Icelandic. By Geir T. Zoëga. v and 551 pp. Clarendon Press, Oxford, 1910.

The author is known for his English-Icelandic and Icelandic-English Dictionary. He prepared this work in the belief that Icelandic may be studied with advantage by English-speaking peoples, because it supplies a linguistic basis for the study of the Scandinavian influence that "was the earliest and one of the strongest of those outward forces which have gone to the making of modern English"; also because Icelandic is the source of much of the information necessary for the understanding of the early period of British history.

CARTOGRAPHY

Maps and Map-Making. Three lectures delivered under the auspices of the Royal Geographical Society. By E. A. Reeves, F.R.A.S., etc. xiii and 145 pp., maps, illustrations and diagrams. The Royal Geographical Society, London, 1910.

Mr. Reeves' little book makes extremely good reading. Any map user who opens it will be sure to turn the page. It is not a treatise. It will not teach the beginner how to do it. Being lectures before the world's most distinguished body of geographic amateurs, it sets forth and admirably illustrates the interesting things in the history of instruments and maps. There is no attempt at completeness either of history or theory; rather a general notion is built up of how map making is done and how the methods have grown. There has been success in this, for the book as a whole is amazingly clear. Only elementary considerations are entered into, of course, but a superficial knowledge of some measuring instruments is assumed. Rarely, an obscure explanation is offered, as that of the polar flattening evidenced by the fact that the number of miles in a degree is greater toward the poles, "inasmuch as the vertical lines, or radii of the arcs subtending the same angle, increase in length," p. 66. Nor can one well assent to the following:—"Even now longitude is much more troublesome to find than latitude, for the reason that there is no natural zero line from which it can be measured," p. 71. Surely longitude would be quite as troublesome to determine if the earth had been created with a natural zero of longitude plainly marked upon it.

Mr. Reeves' examples of modern maps and methods are exclusively British. Surely the best German map-work deserved an example and such beautiful work with contours as Mr. Matthes' Yosemite sheet should have been reproduced. Further there should be mention of the use of colors symbolically, as

on the maps of the United States Geological Survey; blue for water, brown for relief and black for culture.

Most interesting is the geographic gossip: how hard John Harrison found it (p. 43) to get the prize for his successful chronometer till the king took a hand; how it was Newton who really designed the first reflecting instrument (p. 18); how the five mile base on Hounslow Heath was measured with wooden rods in 1783 and again in 1791 with steel tapes, the results agreeing within three inches; that the concept of a spherical earth was probably Chaldaean or Egyptian.

One sees that Mr. Reeves has made ingenious modifications of a number of survey instruments. His man's head drawn upon the world net of various projections to illustrate the distortion due to each is a useful idea. The book is not suited for instruction but geography teachers will find it enjoyable and of use.

MARK JEFFERSON.

POLAR

The North Pole. Its Discovery in 1909. Under the Auspices of the Peary Arctic Club. By Robert E. Peary. With an Introduction by Theodore Roosevelt, and a Foreword by Gilbert H. Grosvenor. xxxii and 373 pp., map, illustrations, appendices and index. Frederick A. Stokes Co., New York, 1910. \$4.80.

The best book Peary has written and in some respects the best that has been published on the Arctic. Not a small part of the volume is a compact expression of the quintessence of a quarter of a century's experience—the outcome of many years of study, planning, experiment and toil. No one could have written the book if he had lacked Peary's preparation for it. The work is therefore unique, both as a contribution to Arctic literature and also as the history of the first conquest of the North Pole by the man who made it.

The volume is worth the closest study of every man outfitting for Polar exploration. It would be foolish for any one to attempt to sail the Smith Sound channels without knowing all that Peary has written here about this long and dangerous stretch of navigation. Peary knew every foot of the Ellesmere Land and Grant Land coasts, all the indentations, the possible shelter for ships, every place where icebergs usually ground and the regions where the tide runs strongest. The reading of many of these pages brings the constantly recurring thought that a large part of Peary's active life was a preparation for the writing of the book.

The explorer says that the meeting place of the tides coming from Baffin Bay on the south, and from Lincoln Sea on the north, is in the neighborhood of Cape Frazer. This Cape, by the way, well-known in Smith Sound annals, does not appear on the map that illustrates the explorer's narrative. The map seems to have been prepared without Peary's supervision. The only new detail it could give were the explorer's routes, from Cape Columbia to and from the Pole and his soundings on the way; but the soundings are not shown and the return route from the Pole is not correctly laid down, for the map shows it as diverging all the way from the northern sledge track, with which it was, however, practically identical.

On his great sledge journey to the Pole, Peary did not use sleeping bags and in fact he has never used them since his first journey over the inland ice to the northern coast of Greenland in 1891-92, when he established the fact that Greenland is the largest island in the world. His party slept on the floor of

their tents or snow huts, with a musk-ox skin under and a light deer-skin over them. The changes he made in his equipment, his use of sheep-skin clothing, (p. 131), the new type of sledge he evolved, (p. 135), his dog harness made like those of the Eskimo but of different material, (p. 136), the preliminary training of the men for the arduous tramp, (pp. 134-138) and his ingenious and original plan for the employment of pioneer relay parties, a scheme that worked perfectly and was very important in his final success, are absorbing reading and full of helpfulness to all future ice explorers.

The work has a good index, the illustrations are admirable and the publishers have done their part in making the volume a satisfying memorial of one of the great achievements of polar enterprise.

GENERAL

Geographische Forschungsreisen und ihre Ziele. Von Dr. B. Bruhns. Mit 19 Abbildungen, 55 p. Karia-Verlag Abt.: *Natur u. Kultur*, Munich, 1910.

Dr. Bruhns mentions Shackleton, Hedin, and Peary as illustrating the leading types of explorers. He classes Shackleton's work as scientific and that of Hedin as resulting in much new information, but, being the work of one man, in forced marches over a great area, not so closely studied as to have the highest value. In Peary's work, the expedition to the Pole, he sees a very strenuous effort to reach the goal without great geographical results, as earlier enterprise had practically determined that the Pole is in the midst of the sea area. The exploration of the future, he believes, will consist chiefly of parties made up of experts in the various branches of geographic knowledge, the sum total of whose results will enrich geographical science. He especially mentions Hans Meyer and his studies in vulcanism and glaciology; Shackleton, the Sarasins in their studies of the most primitive human beings, as the Wedda and Sakai, and the Duke of Mecklenburg in his African work, as conspicuously illustrating the type of explorers needed for future field work.

Geologische Charakterbilder. Herausgegeben von Dr. H. Stille. 2 Heft. Grosse erratische Blöcke im norddeutschen Flachlande. Von F. Wahnschaffe. Tafeln 1-6. M. 3.60. 3 Heft. Das Karstphänomen. Von A. Grund. Tafeln 1-6. M. 4.80. Verlag von Gebrüder Borntraeger. Berlin, 1910.

This series of Charakterbilder uses reproductions of very carefully selected photographs to illustrate the structure of mountains, typical development of geological formations, the morphology of the earth's crust and other geological phases. Each number is complete in itself and may be purchased separately. The plates in Heft 2 finely represent some of the great erratic that are distributed over Northern Germany. Heft 3 has eight illustrations of typical Karst phenomena in Austria, Bosnia and Herzegovina. Each plate is accompanied by descriptive text and in each number is a short paper on the general topic illustrated.

O 2º Visconde de Santarem e os seus Atlas Geographicos. Por Jordao A. De Freitas, Official da Real Bibliotheca d'Ajuda. (Estudo publicado pelo actual Visconde de Santarem.) 182 pp., 1 plate and appendix. Oficina Typographica, Lisboa, 1909.

The work contains a biographical sketch of the second Viscount de Santarem,

a description of his historical activities and a detailed account of the beginnings, progress and completion of his great Atlas, which involved long and enormous labor; also of his great collection of maps of the world and hydrographic and historical maps, which practically form a record of the history of cartography and of geographical progress during the Middle Ages. Complete lists of the maps used by the Viscount in his Atlas are found in the appendices.

Ratgeber für die Ausrüstung von Reisenden nach Übersee u.

Tropen. Praktische Ratschläge für forschungsreisende Expeditionen, Auswanderer, nebst ausführlichem Verzeichnis von Büchern und Karten. Von Ch. F. Harford. Deutsche Ausgabe bearbeitet von Dr. F. Paech und J. Steiner. 148 pp. Dietrich Reimer (Ernst Vohsen), Berlin, 1910. M. 1.

A translation of Mr. Harford's work in English. The book (of convenient size for the pocket) is one of the best helps yet prepared in small compass, in its suggestions as to the essentials of outfit for tropical exploration. These concise suggestions fill only the first 64 pages of the book. The remainder is given to comprehensive lists of literature and maps relating not only to the German Colonies, but also to other parts of the world in which the field of exploration is still inviting. These lists are well worth adding to every geographical library.

Ibn G'ubayr. Viaggio in Ispagna, Sicilia, Siria, Palestina, Mesopotamia, Arabia, Egitto, Compiuto Nel Secolo xii. Prima Traduzione, Fatta Sull'Originale Arabo. Da Celestino Schiaparelli. 412 pp. and Index. Casa Editrice Italiana, Rome, 1906. L. 10.

Prof. Schiaparelli has rendered distinct service by this translation of the travel book of Ibn G'ubayr, renowned in Arabic literature. He made three journeys to Mecca. The "Rihlat" (Journey), now translated, contains his long account of his first journey from Feb. 4, 1183, to April 25, 1185, during which he visited all the countries mentioned in the above title. The narrative stimulated many similar pilgrimages by Arab travellers, which resulted in large additions to geographical knowledge. The volume contains interesting and unique descriptions of regions, cities and routes, as Ibn G'ubayr found them in the Twelfth Century.

Kunst und Völkerentwicklung. Herausgegeben von Prof. Dr. Gustaf Kossina. 1 Heft. Spiral—Mäander—Keramik und Gefäßmalerei Hellenen und Thraker. Darstellungen über früh und vorgeschichtliche Kultur-, Kunst- und Völkerentwicklung. Von Dr. Georg Wilke. Mit 99 Textabbildungen und 1 Tafel. 80 pp. Curt Kabitzsch (A. Stubers Verlag), Würzburg, 1910. M. 4.50.

Treats of the origin of the forms of ancient ornamentation, which it describes and illustrates, as applied to potteries, etc.

A Vagabond Journey Around the World. A Narrative of Personal Experience. By Harry A. Franck. xxii and 483 pp. and illustrations. The New York Century Co., New York, 1910. \$3.50.

One of the most unique of travel books. It is the story of a young university man who made a journey around the world absolutely without money except the little he earned on the way. He travelled much in the steerage, lived

in the slums, discovered a new kind of tramp in France who evades the laws against vagrancy by peddling thread and needles, and found shelter in barns when landlords refused to let him camp on the office floor. He was an object of charity at Port Said, found unpleasant experiences almost everywhere and was turned hungry from a Catholic retreat in Palestine because his views on religious matters were not acceptable.

But there were also many bright features of his long travels and, on the whole, he enjoyed his varied experiences, was happy when the sun shone and bore rebuffs and misfortune with good humor. His book is differentiated from most other travel books by the fact that it is replete with information concerning the poor of every land and the humblest ways of life in every country. It is full of incident and is continually lightened with humor. Mr. Franck has told exactly how a man may girdle the globe without money, weapons or baggage—but not one man in a million would care to emulate his example.

La Conquête minérale. Par L. de Launay. 389 pp. 8vo. Ernest F. Flammarion, Paris, 1908. Fr. 3.50.

The study of mineral resources, in the widest meaning of the word "study," is the object of this work. It tells us what part mineral resources have played, in the past and present, in the industrial, economic, social, and political life of the nations, in the movements and conflicts of the races, in the settlement of countries and continents, and it also describes the technical sides of their exploitation. Partly scientific and partly philosophical, it is always thorough, without ever being dry, always interesting, without ever being superficial.

After an introduction on the nature and function of mineral resources, the evolution of their special uses, and their legal character as national or private property, the influence of the hidden treasures under the ground upon the history of the nations receives elaborate treatment. We learn how flint and amber were first utilized by primitive man for means of defense and adornment; how the wish to outdo anything that existed in the monumental line was nursed by the discovery of the diorites and basalts of Egypt; how Rome, through the contact with Carthage, the London of antiquity, and the conquest of her mines in Africa, Sardinia, and Spain, underwent the transformation from an agricultural into an industrial and engineering nation, quite similar to that which the United States experienced after the discoveries of the coal and oil fields of Pennsylvania, and the copper and iron of Lake Superior. It was by means of Spanish money that Hannibal made his famous invasion into the heart of Italy, and when Rome had wrested from Carthage the lead and silver of Cartagena, the mercury of Almaden, the copper of Rio Tinto and Tharsis, the tin of Galicia and Portugal, the gold of Grenada and the Douro, its final triumph in the struggle was assured.

We learn how the discovery of the mineral wealth of the West Indies killed the until then flourishing mining industries of Italy and Spain and, what was worse, also killed the industry and enterprise of the two nations, and how the attraction of the treasures of the Far West, of Australia, and South Africa, opened up these countries to civilization. A special study is given to the rise and decadence of mining camps and towns. Then the evolution of mining itself from the earliest times to the present is taken up, with a description of modern mines and mining, their apparatus and dangers, the life and conditions of the miners in the various kinds of mines, the influence of the output of

the mines on the financial situation, the probable duration of the existing (or known) supplies of mineral resources and their preservation, etc. American readers ought to take especial notice of the fact that mortality among coal miners in the U. S. had, from 2.59 per cent. in 1898, risen to 5 per cent. in 1907, while in the latter year it was 1.97 per cent. in Prussia and 1.04 per cent. in France.

On the average, however, the life of the miner is not particularly injurious to health. In England, for instance, for every 1,000 male deaths among the whole population there are only 925 among miners, against 1,176 among quarry workers, 1,221 hodcarriers, 1,301 iron and steel workers, 1,370 printers, 1,392 chemical workers, 1,706 ceramic workers, 1,725 hotel employees, and 1,829 dock hands. Longevity, too, among the miners is greater, in France, than among farmers and commercial people, and only 1/7 lower than the average for all industries. The influence of deaths due to accidents is more than compensated through the lesser death rate from alcoholism, nervous and liver diseases, and consumption, which is due to the stricter discipline that must be enforced in the mine on account of its dangers. It seems proved, too, that the great accidents which swell the mortality figures occur only, as a rule, whenever large numbers of untrained men, not grown up under the régime of the mining community, are employed in the mines. This observation will most likely account for the large number of casualties in America where a regular mining population, in which the traditions of the profession are handed down for generations from father to son, as is the case in Central Europe, is not found at all.

MARTHA K. GENTHE.

The Earning Power of Railroads, 1909. Compiled and Edited by Floyd W. Mundy. 428 pp., and index. James. K. Oliphant & Co., New York, 1909.

A hand-book for investors and others interested in railroad securities. The fundamental principles which the investor must apply in studying the value of railroad stocks or bonds are explained in a general way and the statistics, relating to earnings, mileage, capitalization, tonnage, etc., are so arranged as to facilitate the comparison of these data for each railroad.

Railroad Promotion and Capitalization in the United States. By Frederick A. Cleveland and Fred Wilbur Powell. xviii and 368 pp. Longmans, Green & Co., New York, 1909. \$2.

A work of great value to all interested in the history of transportation development in the United States. The intricate subject is presented with much clearness, which is especially emphasized by the fact that the literary style is concise and the whole topic, while discussed in its many phases, is kept within reasonable compass. A striking feature is the bibliography filling nearly fifty pages. The cost of this part of the work which involved the collection of scattered materials from numerous libraries where early periodicals and documents might be found was largely borne by the Carnegie Institution.

Official Proceedings of the Eighteenth National Irrigation Congress. Held at Pueblo, Colorado, Sept. 26-30, 1910. Edited by Arthur Hooker Gehman. xxiv and 412 pp., 2 ills. The Franklin Press, Pueblo, Colorado.

A verbatim report of the transactions of the Congress, and of the papers read before it.

Lehrbuch der Erdkunde für höhere Schulen. 6 Teilen. Herausgegeben von A. Steinhauff, und Prof. Dr. M. G. Schmidt. I Teil, 75 pp., M. 1.20; II Teil, 71 pp., M. 1.20; III Teil, 115 pp., M. 1.60; IV Teil, 63 pp., pf. 80; V Teil, 70 pp., pf. 80; VI Teil, 130 pp., M. 1.60. With many photo-engravings and other illustrations. Druck u. Verlag von B. G. Teubner, Leipzig, 1910.

A series of geographical text-books for higher schools. The size of the books (large octavo) facilitates the insertion of a large number of photo-engravings and pictures in colors, selected as types illustrating geographical facts or principles. This is an innovation, for most of the geographical texts in Germany have few or no illustrations. No maps are given and the student has to depend upon the excellent school atlases, as is usual in German schools. The author has prepared the text with a view to awaken and sustain the interest of the student, to emphasize causal relations and to give clear accounts of physical features, and other phases of physical geography. The sixteen pages given to the forms of the land in Africa and their relation to the inhabitants and their activities is one of the best summary accounts in German text-books.

A Physiographical Introduction to Geography. By A. J. Herbertson, M.A., Ph.D. 120 pp., maps and diagrams. Clarendon Press, Oxford, 1910.

An introduction to the "Junior Geography" and "Senior Geography" in the series of "The Oxford Geographies." It gives brief and simple treatment to physiographic features, climatic regions, the ocean, plant and animal regions, distribution of the human race and of its activities and the raw materials it uses, means of transport and a chapter on latitude, longitude and map nets. The maps are numerous and good. A useful book to introduce geography courses in the higher grades of the public schools.

A Man of War in the East Indies. Being the Log of Commission of H.M.S. "Proserpine." 1908-1910. With a full account of the blockade of the Somali Coast, and the prevention of gun-running in the Persian Gulf. By A. W. Furness. 243 pp., illustrations and map. The Westminster Press (Gerrards, Ltd.), London, 1910. 5s.

Interesting as a picture of events on a British man-of-war. It depicts the life of the British blue-jacket at sea. The narrative covers a period of about two years during which the *Proserpine* visited many ports from Gibraltar to Colombo, in the Mediterranean, the Arabian Sea and the Indian Ocean.

Economic Geology. With special Reference to the United States. By Heinrich Ries. New and Revised Edition. xxxi and 589 pp., 237 illustrations and maps in the text, 56 plates and index. The Macmillan Co., New York, 1910. \$3.50.

This standard work has reached its third edition. An extended review of it appeared in the *Bulletin* (Vol. 38, p. 393, 1906). Our knowledge of economic geology has expanded to such an extent since the first edition was printed in 1905, that Dr. Ries has made a complete revision of the book. He has added considerable matter dealing with the principles of the subject, also descriptive of new found occurrences. As in the earlier editions, the most important occurrences and the general geological or mineralogical matter appear in larger type. The statistics have been brought down to the time of publication. It is the most satisfactory text-book on the subject, and the questions treated are so fundamentally related to the prosperity of the country that the book cannot fail to interest and edify all intelligent readers.

Tables for the Projection of Graticules, for Maps on the scale of 1:1,000,000. 6 pp. Prepared by the Geographical Section of the General Staff, War Office, London, 1910, 2d.

Table 1, shows values of 1° arcs of the meridian in miles and in inches at the scale of 1:1,000,000, from latitude 0° to 60° . Table 2, gives the co-ordinates of the intersections of the parallels of latitude and meridians in miles, also in inches at the scale of 1:1,000,000.

Buried Herculaneum. By Ethel Ross Barker. xvi and 253 pp., illustrations, plans and index. Adam and Charles Black, London; The Macmillan Co., New York, 1908. \$3.

Most visitors to Naples pass by the excavations at Herculaneum because there is so much more to see at Pompeii. About 20,000 people visit the latter city for every 1,000 who stop at Herculaneum. Over two centuries ago, however, half of buried Herculaneum had been brought to light and many mosaics, frescoes, bronzes, etc., were taken away. Then renewed outpourings of Vesuvius buried the city again and little has since been done to renew the work of excavation which has made such great progress at Pompeii. The fact that the Government now proposes to make excavations on a large scale will renew interest in the buried city that shared the fate of Pompeii in the great eruption of 79 A.D., when it was overwhelmed in a stream of liquid mud. We have to go chiefly to the Museum at Naples to see the art treasures which, two centuries ago, were recovered from Herculaneum. The supreme interest of the town lies in the unique bronzes and marbles that were found there. It may be that the excavations now proposed will bring to light many other precious relics of ancient art.

This is a timely book. The author tells of the life in the town so far as we have learned it, of its history and excavations, describes its general plan, the theatre, the Basilica, the temples and other public edifices and private dwellings as excavations, thus far, have revealed them. Several chapters are given to the prolific subject of the treasures of Herculaneum, and the book contains a large number of photo-engravings of these sculptures, frescoes, bronzes, and marbles with descriptions of them. These illustrations will be a revelation to many who have not seen the originals. This part of the book comprises about 80 pages. There are numerous plans and illustrations of excavated buildings, etc.

Brief List of Meteorological Text-Books and Reference Books. A selection of works suitable for General, Scientific and University Libraries in the United States. By C. F. Talman, Librarian, U. S. Weather Bureau. Pp. 18. Second edition. U. S. Department of Agriculture, Weather Bureau. 8vo. Washington, 1910.

The Weather Bureau has issued a second edition of the useful list of meteorological text and reference books, compiled by the Librarian. This bibliography may be warmly recommended to all teachers and students of meteorology and climatology, who will find it a well-classified and serviceable list for all general purposes. In addition to the names of the authors and the titles, there are included, in most cases, brief statements regarding the general character and scope of the various works in the list.

R. DEC. WARD.

CURRENT GEOGRAPHICAL PAPERS

NORTH AMERICA

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NEW MAPS

NORTH AMERICA

U. S. GEOLOGICAL SURVEY SHEETS

ALASKA. (a) Topographic map of Berners Bay Region, Alaska. 1:62,500 = 0.9 mile to an inch. 3 colors. Contour interval 50 feet; (b) Geologic map of Berners Bay Region. 1:62,500. 6 colored symbols. Illustrate *Bull.* 446, "Geology of the Berners Bay Region, Alaska," by Adolph Knopf, Washington, 1911.

UNITED STATES. Drainage Basins of the Southern Appalachian Mountains. 1 inch = 34 miles. 3 colors. Illustrates *Prof. Paper 72*, "Denudation and Erosion in the S. Appalachian Region and the Monongahela Basin," by L. C. Glenn, Washington, 1911. [Each of the drainage basins is bounded by red lines.]

UNITED STATES. (a) Map of vicinity of Austin, Tex. 1 inch = 6 miles. [Showing location of quarries, etc.]; (b) Map showing Slate Area of Arkansas. 1 inch = 50 miles; (c) Map showing outcrop area of Niobrara formation in South-Central Nebraska. 1 inch = 30 miles. [Shows limestones used for cement manufacture in the Republican Valley]; (d) Map Showing principal Areas of gravel Deposits in Pittsburg District, Pa. 1 inch = 14 miles. [All maps black.] Illustrate *Bull. 430-F* "Advance Chapter from Contr. to Econ. Geol. Part 1, 1909, Structural Materials," by E. F. Burchard and others. Washington, 1910.

UNITED STATES. (a) Map showing Extent of Phosphate Reserve of Idaho, Utah and Wyoming, May, 1910. 1 inch = 30 miles; (b) Preliminary Map and Structure Sections of the Georgetown Canyon Phosphate Area, Idaho. 1 inch = 1 mile; (c) Geologic Map of Sublett Mts., Wyoming and Adjacent Portions of Idaho. 1 inch = 1 mile. [Shows extent of phosphate outcrops, with sections and analyses of phosphate beds.]; (d) Preliminary Geologic Map and Structure Section of the Cokeville Area, Wyoming. 1 inch = 1 mile; (e) Geologic Map of the Crawford Mts., Utah. 1 inch = 1 mile. [Shows extent of phosphate outcrops.]; (f) Geologic Map of Phosphate Deposits near Woodruff, Utah. 1 inch = 1 mile. All maps black. Illustrate *Bull. 430-H*, "Preliminary Report on the Phosphate Deposits in Southeastern Idaho and Adjacent Parts of Wyoming and Utah." Washington, 1910.

UNITED STATES. Map showing condition of Astronomic Location and Primary Control to Jan. 1, 1909. 1 inch = 270 miles. 3 colors. *Bull. 440*, "Results of Triangulation and Primary Traverse for 1906-07-08," by R. B. Marshall, Chief Geographer. Washington, 1910. [Red shows astronomic stations and areas tinted brown are controlled by triangulation or traverse.]

U. S. HYDROGRAPHIC OFFICE CHARTS

Pilot Chart of the North Pacific Ocean, Oct., 1910, April, 1911.

Pilot Chart of the South Pacific Ocean, Sept., Oct., and Nov., 1910.

Pilot Chart of the North Atlantic Ocean, Aug., and Sept., 1910.

U. S. WEATHER BUREAU CHARTS

Meteorological Chart of the North Atlantic Ocean. Oct., 1910, Feb., 1911.

Meteorological Chart of the North Pacific Ocean. Oct., 1910, Feb., 1911.

Meteorological Chart of the Great Lakes. Feb., 1911.

Meteorological Chart of the Indian Ocean. Feb., 1911.

U. S. DEPT. OF AGRICULTURE MAPS

UNITED STATES. Soil Survey Map of the Woodland Area, Cal., 1:62,500; Alkali Map of the Woodland Area, Cal., 1:62,500. Soil Survey Maps of Clay Co., Miss., Pike Co., Ga., and Titus Co., Tex., 1:63,360. Soil Survey of Tallapoosa Co., Ala. 1 inch = 1 mile. [Colors.] [With descriptive letter press.]

BUREAU OF THE CENSUS MAPS

UNITED STATES. Maps of Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Oklahoma, Tennessee, and Texas, showing production of cotton in 1909. No scale. Black. Illustrate *Bull. 107*, "Cotton Production, 1909." [Shows by symbols the distribution and intensity of cotton raising in these states.]

U. S. LAKE SURVEY OFFICE MAPS

UNITED STATES. Magnetic Variations over Lake Superior, for 1910. Prepared under the direction of Major C. S. Riché. 1:1,200,000 = 18.93 miles to an inch. 3 colors. Illustrates "Survey of Northern and Northwestern Lakes," *Bull. No. 19, Supp. No. 3*, U. S. Lake Survey Office, Detroit, Mich., 1910.

PANAMA COMMISSION MAPS

PANAMA CANAL. (a) Map of Canal Zone, to accompany the Annual Report of the Commission. 1 inch = 1.6 mile to an inch. 5 colors. *Ann. Rep. Isthmian Canal Comm.*, 1910, Wash. [Topography shown by hachures. Gives boundary lines of Canal Zone, center line of Canal, and relocated route of the Panama RR., dams and locks]; (b) Contour Map and Profile of the Panama Canal. Showing Central Division Dumps and Excavation for the Fiscal Year ending June 30, 1909. 1:40,000; (c) Map of Panama showing Canal Zone and water shed of Rio Chagres. 1:100,000 = 1.57 mile to an inch. 4 colors. With *Ann. Rep. Pan. Can. Comm.*, 1909, Washington.

NEW YORK. Map of New York showing distribution of Salina Strata. 1 inch = 25 miles. 3 colors. By D. H. Newland. Illustrates "Gypsum Deposits of New York," by D. H. Newland and Henry Leighton, in New York State Museum, *Bull.* 143, Albany, 1910. [The workable gypsum deposits are restricted to the Salina stage of the Upper Siluric system. The Salina Strata are shown in red.]

CANADA. Explored Routes on parts of Albany, Severn, and Winisk Rivers, etc. Northern Ontario and N. W. Territories. 1:506,880 = 8 miles to an inch. 4 colors. Accompanies "Report on a part of the N. W. Terr. drained by the Winisk and Attawapiskat Rivers," by William McInnes. No. 1080. Dept. of Mines, Geol. Surv. Branch, Ottawa, 1910. [Geological formations shown in colors along routes followed by 17 exploring parties from 1871 to 1907.]

CANADA. Lake Nipigon, Thunder Bay District, Ontario. 1:253,440 = 4 miles to an inch. [11 colored symbols for formations.] In *Mem.* 1 "Geology of the Nipigon Basin, Ont.," by Alfred W. G. Wilson. Dept. of Mines, Geol. Surv. Branch, Ottawa, 1910.

CANADA. (a) Edmonton, Alberta. 1:31,680 = 0.5 mile to an inch. 3 colors. Contour interval 25 feet. [Plan of the City with contours of elevation.]; (b) Edmonton, 1:31,680. 3 colors. [Isobaths showing probable depth, in feet below surface, of Clover Bar coal seam which underlays the city on both sides of the Saskatchewan.] Illustrate "The Edmonton Coal Field." By W. B. Dowling, *Memoir* No. 8-E, Dept. of Mines, Geol. Survey Branch, Ottawa, 1910.

CANADA. (a) Tantalus Coal Area, Yukon Terr. 1:126,720 = 2 miles to an inch, [13 colored symbols for formations and coal outcrop.]; (b) Braeburn-Kynocks Coal Area, Yukon Terr. 1:126,720. [11 colors and symbols for formations and coal outcrops]; Illustrate "Preliminary Memoir on the Lewes and Nordenskiöld Rivers Coal District, Yukon Terr.," by D. D. Cairnes. *Memoir* 5, Dept. of Mines, Geol. Surv. Branch, Ottawa, 1910.

CANADA. (a) Proposed Forest Reserve on the Eastern Slope of the Rocky Mts. 1 inch = 35 miles. 3 colors; (b) Basin of the Ottawa River, 1 inch = 35 miles. 3 colors. Illustrate *First Ann. Rep't.*, Comm. of Conservation, Canada, Ottawa, 1910.

CANADA. Part of the Selkirk Range adjacent to Mount Sir Sandford. 1:125,000 = 1.97 miles to an inch. 3 colors. By Howard Palmer, 1908-09. Illustrates "Explorations About Mount Sir Sandford, B. C." same author. *Geogr. Journ.*, Vol. XXXVII, No. 2, 1911, London. [Constructed from photographs and prismatic compass bearings, adjusted to points of the government triangulation.]

CANADA. Index to Townships in Manitoba, Saskatchewan, Alberta and British Columbia. 1:2,217,600 = 35 miles to an inch. 5 colors. With *Ann. Rep. of the Topogr. Surveys Branch, Interior Dept.*, 1908-1909, Ottawa, 1910.

CANADA. (a) Sketch Map of Part of the Railway Belt, British Columbia. 1 inch = 4 miles. 4 colors. With *Report* of P. A. Carson. [Shows topographical features in the Basins of the Blaeverry River, Bush River, Gold Creek and their confluence together with the Continental Divide, northwest from Mt. Freshfield]; (b) Sketch Plan, showing topography of the eleventh base line across ranges 8 to 19, west of the fifth meridian. 1 inch = 2.5 miles. With *Report* of

B. J. Saunders. [This region lies on both sides of the Saskatchewan R. Details as to soils, vegetation, etc., indicate that the district is suitable for settlement]; (c) Map of the Boundary between British Columbia and Yukon Territory from Tatshenshini R. to Teslin Lake. 1 inch = 80 chains. 3 colors. [Main topographical features with many elevations in figures on both sides of the boundary are shown.] In *Ann. Rep. of the Topogr. Surveys Branch for 1908-09*, Dept. of Interior, Ottawa, Can., 1910.
1908, 3 Vols., Argentine Meteorological Office, Buenos Aires, 1909.

MEXICO. Croquis geológico y topográfico del Valle de Ixmiquilpan. 1:200,000 = 3.14 miles to an inch. 7 colors showing formations. 2 profiles with "Estudio hidrológico del Valle de Ixmiquilpan, Hidalgo." Por el Ing. Trinidad Paredes. *Parergones* del Inst. Geol. de Mexico, Tome III, Núm. 3. Mexico, 1909.

SOUTH AMERICA

ARGENTINA. (a) Map of railways of the Argentine Republic. January, 1909. 1:2,500,000 = 39.46 miles to an inch. 7 colors. 7 insets on larger scales show R.R. termini in important towns. Gauge of R.R.'s shown; (b) The Argentine Republic, 1909. 1:8,500,000 = 134.10 miles to an inch. 4 colors. [Shows distribution of hydrometric stations.] (c) Argentine Republic, 1909. 1:8,500,000. 6 colors. [Shows distribution of meteorological stations.]; (d) Argentine Republic, 1909. 1:8,500,000. 5 colors. [General map of the Republic.]; (e) Hypsometric map of the Argentine Republic. 1:16,000,000 = 252.53 miles to an inch. 3 colors. [Seven tints of brown for lands above 100 meters, and blue for lands under 100 meters in elevation. Illustrate "Agricultural and Pastoral Census of the Nation. "Stock-Breeding and Agriculture in

AFRICA

GERMAN SOUTHWEST AFRICA. Deutsch-Südwestafrika. Bearbeitet von Paul Sprigade und Max Moisel. Mit Namenverzeichnis. 1:2,000,000 = 31.56 miles to an inch. 6 colors. Verlag von Dietrich Reimer (Ernst Vohsen), Berlin, 1910. Mk. 5. [A good general map with complete nomenclature. Topography in brown wash. The diamond fields are shown along the coast between 24° and 28° S. Lat.]

FRENCH CENTRAL SUDAN. Mission Tilho. (a) Lac Tchad. [Aspect of the Lake in 1908. Based on surveys from Nov., 1907 to May, 1908, together with earlier studies.]; (b) Bahr el Ghazal. [Based on astronomical observations and surveys]; (c) Bodeli et Borkou. All 1:500,000 = 7.89 miles to an inch. 4 colors. With "Documents Scientifiques de la Mission Tilho (1906-1909)." Ministère des Colonies, Paris, 1910. [Itineraries of the mission and other explorers, contours of elevation, astronomical points established, wells, etc., with much information as to geology, distribution of vegetation, topography, etc. The sheets cover Lake Chad and large areas to the east and northeast of it. They are at present our best source of information relating to this area.]

TRANSVAAL COLONY. Map of the Transvaal Colony revised January, 1909. 4 colors. *Rep't. of Transvaal Geol. Surv. for 1909*, Pretoria, 1910. [Shows areas of completed survey up to end of 1908, and areas completed during 1909.]

TRANSVAAL COLONY. Geological Survey Sheets. 1 inch = 2.3 miles. (a) Plate IX: Portions of Waterberg and Rustenburg Dist.; (b) X: Portion of the Waterberg Dist.; (c) XI: Middleburg and Lydenburg Dist.; (d) XII: Portion of Lydenburg Dist.; (e) XIII: Portion of the Marico Dist.; (f) XIV: Map of the Klip River Valley. [Colored symbols show geological formations.] With *Rep't. Transvaal Geol. Surv.*, 1909. Pretoria, 1910.

ASIA

CHINA. Chart of the newly established Port of Heungchow and Surrounding District. No scale. 2 colors. Illustrates "Returns of Trade and Trade Reports, 1909. Stat. Series, Nos. 3 and 4." Imperial Maritime Customs. China. Shanghai, 1910.

CHINA. Hoebel's Karte v. China. 1:4,500,000 = 71.02 miles to an inch. 3 colors. Simon Schropp'sche Landkarten-Handlung, Berlin, 1911. [A notable map of China. It contains over 7,000 names clearly printed so that all are easily read. The terrain is well defined in brown, the provincial boundaries are clearly expressed, and the hydrographic features are well shown. A feature is the spelling of place names in accordance with the provincial dialects, the common practice being to use the Peking dialect for all names. Telegraphs, railroads, mission stations, and much other information are given.]

INDIA. Geological Sketch Map Showing the distribution of the coal fields of the Naga Hills. 1 inch = 8 miles. Black. Illustrates "Some Coal Fields in N. E. Assam," by H. H. Hayden. *Records*, Geol. Surv. of India, Vol. 40, Part 4, Calcutta, 1910.

SUMATRA. Kaart der Tabaksondernemingen ter Oostkust van Sumatra. Tevens aangevende de Koffieondernemingen. Naar de nieuwste gegevens bewerkt door P. de Vries & Zoon. 1:200,000 = 3.14 miles to an inch. J. H. de Bussy, Amsterdam, 1910. Fr. 6.50. [A good cartographic picture of the great tobacco-growing industry in Eastern Sumatra. 13 symbols show the distribution and extent of the tobacco holdings and their communications are detailed. Coffee estates also shown. A list of the tobacco, coffee and rubber companies of East Sumatra accompanies the map.]

AUSTRALASIA AND OCEANIA

WESTERN AUSTRALIA. Geological Map of the Country between Arrino and Northampton. 1 inch = 240 chains. 6 colors. By W. D. Campbell. Illustrates "The Irwin River Coalfield and the Adjacent District from Arrino to Northampton," in *Bull.* No. 38, 1910, same title and author, Geol. Surv., W. Australia, Perth.

WESTERN AUSTRALIA. Geological Sketch Map of the Portion of the Eastern Division traversed by the Canning Survey party, 1907-9, from Wiluna to Hall's Creek. 1 inch = 15 miles. 7 colors. Illustrates "Geol. Observations" by H. W. B. Talbot, *Bull.* 39, Geol. Surv., Perth, 1910. [The geological discoveries noted serve to define the areas over which mineral deposits may be expected.]

NEW ZEALAND. (a) North Island; (b) South Island. Showing Land Transactions, 1909-10. 1 inch = 15 miles. Illustrate "*Rept.* of Dept. of Lands, New Zealand, for 1909-10" by W. C. Kensington. Wellington, 1910. [Colors show lands available for settlement, lands taken up during the year, etc.]

BISMARCK ARCHIPELAGO. (a) Höhenschichtenkarte von Neu-Hannover. 1:100,000 = 1.57 mile to an inch. 9 tints for elevations, black nomenclature, and routes in red. Inset: Geologische Kartenskizze von Neu-Hannover. 1:300,000 = 4.73 miles to an inch. [6 tints for geological formations]; (b) Höhenschichtenkarte von Nord Neu Mecklenburg. 1:2,000,000 = 3.14 miles to an inch. [9 tints for elevations.] Insets: Geologische Kartenskizze von Nord Neu Mecklenburg. 1:400,000 = 6.33 miles to an inch. [8 tints for formations], and Nordwestspitze der Insel Tatáu. 1:100,000 = 1.57 mile to an inch; (c) Höhenschichtenkarte von Süd Neu Mecklenburg. 1:200,000 = 3.14 miles to an inch. [12 tints for elevations.] Inset: Geologische Kartenskizze von Süd Neu Mecklenburg. 1:400,000 = 6.33 miles to an inch. [12 tints for formations.]; (d) Übersichtskarte von Neu Mecklenburg u. den Nachbargebieten, zur Veranschaulichung der Lage der bekannt gewordenen Terrassen (Höhenangaben in Metern), entworfen von Dr. Karl Sapper, 1909. 1:1,000,000 = 15.78 miles to an inch. Black; (e) Die Verbreitung der Vegetationsformationen auf Neu Mecklenburg u. den Nachbargebieten. Nach eigenen Aufnahmen, nach Aufnahmen von Dr. G. Friederici u. Angaben von Herrn Boluminski u. der deutschen Seekarte entworfen von Dr. Karl Sapper, 1909. Black. [7 symbols for vegetation. 1:1,000,000; (f) Übersichtskarte der Ungefährten Volksdichte auf Neu Mecklenburg u. den Nachbargebieten, entworfen von Dr. Karl Sapper, 1909. Black. [3 symbols for density of population.] 1:1,000,000; (g) Anir-Inseln. (Feni-Inseln, Wöneram, Insel.) Nach Aufnahmen S. M. S. *Planet*, 1908. Mit geologischen Einzeichnungen von Karl Sapper nach dessen eigener Aufnahme

und Friedericis Angaben. 1:150,000=2.36 miles to an inch. 4 colors. Illustrate "Wissenschaftliche Ergebnisse einer amtlichen Forschungsreise nach dem Bismarck-Archipel im Jahre 1908. 1. Beiträge zur Landeskunde von Neu Mecklenburg und seinen Nachbarinseln," von Dr. Karl Sapper. *Mitt. aus den Deutsch. Schutzgeb., Ergänzungsheft*, No. 3, Berlin, 1910. [These beautiful maps by Dr. Sapper, show the results of his own surveys and the work of other explorers. The nomenclature is large, the forms of the land are shown by tints, bounded by contours of elevation and the maps are first class examples of German cartography. The routes and surveys of all the explorers who have participated in the work are differentiated. Native paths appear and the values of the curves of elevation, whether approximately exact or conjectural, are indicated. The maps are a great addition to our knowledge of little known islands in the Pacific.]

BISMARCK ARCHIPELAGO. (a) Aufnahmen auf Bougainville, 1908. Von Dr. Karl Sapper. 1:50,000=0.79 mile to an inch. 3 colors. 3 sheets, and profile of Dr. Sapper's route in 1:100,000. [Sapper's route survey through the Island supplies the first material for the mapping of the interior of Bougainville. Both profile and route maps contain numerous geological notes and the map shows the direction of all the water courses he crossed]; (b) Buka. 1:200,000=3.14 miles to an inch. 3 colors. By Dr. Karl Sapper. [Shows the routes of Sapper and Friederici, gives approximate and conjectural contours of elevation and differentiates between large and small villages. The map makes a large addition to the nomenclature of Buka]; (c) Geologische Kartenskizze von Buka. 1:200,000. 2 colors. Dr. Karl Sapper, 1910. [Locates reefs, and uplifted coral and shows the distribution of andesite, anesitic tuff and mangrove swamps. The map is based upon the observations of Friederici and Schön and upon Sapper's surveys. A profile through the island by Engineer Schön is given.] Accompany papers on Buka and Bougainville, by Sapper, Friederici, and Schön in *Mitt. aus den Deutsch. Schutzgeb.* 23. Band, 4 Heft, 1910, Mittler und Sohn, Berlin.

EUROPE

AUSTRIA-HUNGARY. Karte der Ankogel-Hochalmspitzgruppe. 1:50,000=0.79 mile to an inch. 3 colors. Contour interval 25 meters. With "Talstudien im Gebiete des Ankogel und der Hochalmspitze by Prof. Dr. E. Stummer. *Deutsch. Rund. f. Geogr.*, xxxiii Jahrg., 4 Heft, p. 159, 1910.

AUSTRIA-HUNGARY. (a) Slovakien, Galizien, Bukowina, Siebenbürgen. No scale. 6 colors; (b) Deutschböhmen, Tschechischböhmen, Mähren, Schlesien. No scale. 5 colors; (c) Slovenien. No scale. 6 colors. Drei Karten zur Ergänzung der Triaskarte. Von Heinrich Hanau. G. Freytag & Berndt, Vienna, 1911.

AUSTRIA-HUNGARY. Karte des politischen Bezirkes Hietzing-Umgebung. 1:100,000=1.57 mile to an inch. Colors. Freytag & Berndt, Vienna, 1910. [2 sheets of this region west of Vienna, one showing political subdivisions by color contrasts and topographic forms by contours with ten meters interval; the other using light and shade for surface forms and red for political boundaries. These sheets would be useful in the class-room to illustrate different methods of cartographic treatment for the same data.]

AUSTRIA-HUNGARY. Triaskarte der Habsburger Monarchie. 1:1,500,000=23.67 miles to an inch. 4 colors. Von Heinrich Hanau. G. Freytag & Berndt, Vienna, 1911, K. 3. [The name of the map is explained by the author's inclusion of Bosnia with Austria and Hungary as a part of the Hapsburg Monarchy. A good map with large nomenclature and unusual attention to the myriads of little lakes scattered over the Hungarian plain. The relief forms are not shown but the hydrography is minutely mapped.]

AUSTRIA-HUNGARY. Königreich Böhmen und Erzherzogtum Böhmen-Eger. No scale. 4 colors. Von Heinrich Hanau. G. Freytag & Berndt, Vienna, 1911. [Accompanied by explanatory text.]

AUSTRIA-HUNGARY. Verkehrs-Karte von Österreich-Ungarn. 1:1,500,000=23.67 miles to an inch. 5 colors. G. Freytag, Vienna, 1911. K. 2. 40. [The

edition of 1911, fully maintains the reputation of this railroad map of Austria-Hungary. It includes insets on larger scales of Vienna, Budapest and North Bohemia and a railroad map of the Balkan Peninsula in 1:3,000,000.]

THE ALPS. Hand und Reise-Karte der Alpen Länder. Bearbeitet von Vincenz von Haardt. 1:1,000,000=15.78 miles to an inch. Ed. Hölzel, Vienna. [A superior tourist map (2nd edition) showing all communications and many elevations in meters.]

CORSICA. Eiszeit—Karte von Korsika. 1:300,000=4.73 miles to an inch. Black. Illustrates "Die Eiszeit auf Korsika" etc., by Dr. Roman Lucerna, in *Abhandl. der k.k. Geogr. Ges. in Wien*. ix Band, No. 1, 1910. Vienna. [43 Glaciers are mapped and named and the most important moraines are shown.]

FRANCE. Carte des gisements de Coquilles Comestibles, de la Rade de Brest, et des Rivières de Landerneau et de Châteaulin. 1:28,000=0.45 mile to an inch. 6 colors. Par Jos. Guérin-Ganivet. Illustrates *Bull. de l'Inst. Océanogr.*, No. 195, 1911.

GERMANY. Strassen-Karte der Provinz Sachsen. 2 sheets. 1:300,000=4.73 miles to an inch. 4 colors. G. Freytag & Berndt, Vienna and Leipzig. 1910. [An unexcelled road map of this Prussian Province.]

GERMANY. (a) Kartenskizze der Temperaturverhältnisse im Böhmerwald. 1:1,000,000=15.78 miles to an inch. 2 colors; (b) Karte der Niederschlags-höhen im Böhmerwald. 1:1,500,000=23.67 miles to an inch. 2 colors; (c) Übersichtskarte des Bayerisch-Böhmischen Waldgebirges. 1:250,000=3.95 miles to an inch. Black. Illustrate "Morphologie des Böhmerwaldes," by Max Mayr. *Mitt. Geogr. Ges. in München*. 5. Band, 2 Heft, 1910, München.

GERMANY. HAVELWINKEL. Lage der Siedlungen. 1:200,000=3.14 miles to an inch. 4 colors. Illustrates "Beiträge zur Siedlungskunde des Havelwinkels. II Teil." Von Max Bolle. *Mitt. des Sächsisch-Thüringischen Ver. f. Erdk. zu Halle*, a. S. 34 Jahrg., 1910. [Shows the angle formed by the junction of the Elbe and Havel, with all the settlements and the nature of the soil upon which they stand.]

IRELAND. Map of Mean Annual Rainfall over Area including Counties of Dublin, Wicklow, Meath and Kildare. 1 inch=6 miles. 2 colors. Illustrates "On the Distribution of Mean Annual Rainfall . . . Over an Area including the Counties of Dublin . . . A Study in Local Variations of Rainfall." By William J. Lyons, *Sci. Proc. Roy. Dublin Soc.*, Vol. xii, (N. S.), No. 30, May, 1910, Dublin.

NETHERLANDS. De Zuiderzee en haar Afwateringsgebied in Nederland. No scale. 3 colors. Illustrates "Wat de afsluiting en droogmaking der Zuiderzee eigenlijk beteekent," by A. A. Beekman. *Tijdsch. Kon. Nederl. Aardr. Genoots.* Tweede Ser., Deel XXIII, No. 1, 1911, Leiden. [Shows areas reclaimed for agriculture from the Zuider Zee.]

OCEANOGRAPHICAL

ATLANTIC-MEDITERRANEAN. Campagne Scientifique de la *Princesse Alice*, 12 Mars-16 Septembre 1910. Itinéraire. Mercator Projection. Black. Illustrates paper, same title, in *Bull. l'Inst. Océanogr.*, No. 182, Oct. 30, 1910. Monaco. [Stations are numbered; soundings in meters.]

POLAR

ARCTIC. Die Wichtigsten Nordpolarreisen des XIX und XX Jahrhunderts in zeitlicher Folge und mit besonderer Berücksichtigung derjenigen, deren Ziel die Erreichung des Pols war. 1:7,500,000=118.37 miles to an inch. Bearbeitet von P. Sprigade u. M. Moisel. D. Reimer (E. Vohsen) Berlin, 1910. [An excellent presentation of facts relating to Arctic discovery. The regions explored have different colors, according to the nationality of the explorers. The routes of exploring vessels and sledge parties are similarly colored. On the margins are concise notes of the work done by each expedition. The hydrography is well shown. Limits of pack, drift, and inland ice are indicated with two shades of blue for sea depths, but no attempt is made to denote the land elevations and no soundings are given.]

EDUCATIONAL MAPS

GERMAN SCHOOL WALL MAPS. (a) Kuhnert, *Physikalische Erdkarte in Mercators Projektion mit Darstellung der Meeresströmungen*. Bearbeitet von Prof. Dr. G. Leipoldt, Dresden. 5 colors; (b) *Asia, Physical Wall Map*. Designed by M. Kuhnert and Prof. Dr. Gust. Leipoldt. 1:600,000=94.6 miles to an inch. 5 colors; (c) *Verkehrskarte von Mitteleuropa*. Politische Karte und Angabe der Eisenbahnen, Wichtigen Alpenstrassen, Dampferlinien, und Telegraphenverbindungen. Von Prof. Dr. Gustav Leipoldt. 1:850,000=13.41 miles to an inch. 6 colors; (d) *Physik. polit. Schulwandkarte von Europa*. In Verbindung mit Prof. Dr. G. Leipoldt, gezeichnet von M. Kuhnert. 1:3,000,000=47.34 miles to an inch. 5 colors; (e) *Schulwandkarte vom Königreich Bayern*, gez. von M. Kuhnert. 1:375,000=5.91 miles to an inch. 5 colors. Inset Politische Übersicht vom Königreich Bayern. 4 colors. Verlag: A. Müller-Fröbelhaus, Dresden. American Agents, Goder-Heimann Co., Chicago, 1910.

[These maps are part of a good series of school wall maps, well adapted for large class-rooms. Most detail may easily be seen from the rear seats. Elevations are shown by deepening shades of brown merging into black and by vivid contrasts between light and shade. Map a, includes sea currents, with red for warm and blue for cold streams; it does not indicate however that the Gulf Stream, a little east of Newfoundland, becomes merely a slow drift. Map b, with English text, represents the high and lowlands of Asia almost with the effect of a relief map. The range which Sven Hedin found extending across southern Tibet is faithfully reproduced. The relief effect is too pronounced in the northeast of Asia for the Stanavoi Mts. are not a continuous range nor so superlative among the mountain features as is represented. The bathymetrical coloring gives a good idea of the continental shelf and ocean floor. The surface of the Caspian sea should have been indicated as standing some 85 feet below sea level. In map c, differing thicknesses of red lines show the relative importance of land transportation routes. Map d, gives an expressive picture of the North Europe lowlands, the plateaus and mountain regions. Map e, on a much larger scale than the other maps, shows the adequacy of the means employed to give a sharp effect of relief on a flat surface. This series has striking merits of its own and will occupy a good place among German school maps.]

ATLASES

Stieler's Atlas of Modern Geography. 100 Maps with 162 inset maps, engraved on copper. Adapted for the use of the English-speaking public. By B. V. Darbishire, M. A. Ninth Edition. Justus Perthes, Gotha, 1909. \$15.

This issue of the Ninth edition, removes, as far as practicable, the difficulty which users of the atlas, who cannot read German have experienced. All references, explanations of symbols, and abbreviations, etc., are now given on the back of each map in four languages. The reader therefore who knows one of these languages (English, French, Italian, Spanish) has as near an approach to Stieler in the language he understands, as it is possible to give him without relettering the whole of the maps. This scheme increases the value of the atlas as an international work.

In his preface to the present issue, Mr. B. V. Darbishire, an English cartographer, of Trinity College, Oxford calls attention to some of the methods and merits of Stieler's Atlas which are well worth the attention of many map houses. Every large scale map is based on original material. "Maps in other atlases are held to be simply non-existent and the compiler of the map in Stieler gets the information he requires from official surveys, and, in the case of less-known countries from the surveys and sketches of explorers. Each map is the work of a scientifically trained geographer well qualified to sift the material placed at his disposal." On each sheet proper value is given to the relief of the land without which a true map picture cannot be given." This international edition will be valued by thousands who have found the German language to be an impediment in their use of the Stieler atlas.

OTHER ACCESSIONS

NOV.-DEC., 1910.

AMERICA

BARBER, JOHN W. and HOWE, HENRY. Historical Collections of the State of New York, etc. [Map], etc. New York, S. Tuttle. 1841. sm. 4to.

COLTON, WALTER. Three Years in California. [Map], etc. New York, A. S. Barnes & Co. 1852. 12mo.

GREATOREX, ELIZA. Landmarks of Old New York. [60 Plates in Portfolio] [New York, 1875?].

HANBURY, DAVID T. Sport and Travel in the Northland of Canada. (Maps, etc.) London, Edward Arnold. 1904. 8vo.

HOTCHKIN, JAMES H. A History of the Purchase and Settlement of Western New York, and of the Rise, Progress, and Present State of the Presbyterian Church in that Section. [Frontispiece] New York, M. W. Dodd. 1848. 8vo.

LANDENSIO, EUGENIO. Excursion a la Caverna de Cacahuamilpa y Ascension al Crater del Popocatepetl. [Illustrated] Mexico, Impr. del Colegio del Tecpan. 1868. 8vo.

LEONARD, JOHN WILLIAM. History of the City of New York. 1609-1909, etc. (Illustrations) New York, Journal of Commerce and Commercial Bulletin. 1910. large 8vo. *Gift*.

MASSACHUSETTS HISTORICAL SOCIETY, Proceedings of the, October, 1909-June, 1910. Vol. XLIII. (Maps, etc.) Boston, Published by the Society. 1910. 8vo.

MORLEY, FREDERICK. Michigan and Its Resources, etc. Compiled by —. (Map), etc. Lansing, W. S. George & Co. 1881. 8vo.

PARKER, NATHAN H. The Kansas and Nebraska Handbook for 1857-8. With a New and Accurate Map. Boston, John P. Jewett and Co. 1857. 12mo.

SNOWDEN, RICHARD. History of North and South America. From its Discovery, to the Death of General Washington. 2 Vols. in 1. [2 Maps.] Philadelphia, Johnson & Warner. 1811. 12mo.

AFRICA

EGYPT EXPLORATION FUND.. Thirtieth Memoir; The XIth Dynasty Temple at Deir El-Bahari, Part II. By Edouard Naville. With Architectural Descriptions by Somers Clarke. (Plates) London, Egypt Ex. Fund. 1910. 4to.

ASIA

ALCOCK, SIR RUTHERFORD. Art and Art Industries in Japan. Illustrations. London, Virtue and Co. 1878. 8vo.

ANSTEY, T. CHISHOLM. Crime and Government at Hong Kong. A Letter to the Editor of the "Times" Newspaper; etc. London, Effingham Wilson. 1859. pr. 8vo.

BRETON, [DE LA MARTINIÈRE, J.-B.]. China: its Costume, Arts, Manufactures, &c. Edited principally from the originals in the cabinet of the late M. Bertin: with Observations, . . . by M. —. Translated from the French. 4 Vols. in 2. Plates. London, Howlett and Brimmer. 1824. 8vo.

COLDSTREAM, WILLIAM. (*Editor*.) Records of the Intelligence Department of the Government of the North-West Provinces of India during the Mutiny of 1857. . . Arranged under the Superintendence of Sir William Muir, etc. 2 Vols. Edinburgh, T. & T. Clark. 1902. 8vo.

CUMMING, C. F. Gordon. Wanderings in China. 2 Vols. (Map), etc. Edinburgh, William Blackwood & Sons. 1886. 8vo.

DIXON, WILLIAM GRAY. The Land of the Morning. An Account of Japan and its People, etc. Map, etc. Edinburgh, James Gemmell. 1882. 8vo.

DOBEL, PETER. Travels in Kamtchatka and Siberia; with a Narrative of a Residence in China. 2 Vols. [2 Illustrations.] London, Henry Colburn and Richard Bentley. 1830. 12mo.

DE WINDT, HARRY. Siberia As It Is. With an Introduction by Her Excel-

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THE CULTURE OF THE NATIONS

BY

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On the topographic map that the Geologic Survey is making of the United States, water is shown always in blue, in sea, lake, swamp or river; the height and molding of the land in brown, while black is reserved for a whole class of things called by the surveyor "culture." He means things made by men, and the definition is not without interest to students whose thought of culture is less material. In what degree do the various nations of the earth take part in the making of these things? Of course, the great manufacturing countries are well known, but even the surveyor means more by culture than the product of the factories. For there are houses, bridges, roads, railroads, villages, towns, cities and boundaries, all in black on his maps. Equally within his definition of culture, though he can hardly map them, are books, pictures, statues, music, laws and institutions. These things must not be assumed to abound most in manufacturing countries.

Are there any products of culture that are typical of what culture fairly stands for and at the same time so well ascertained and reported that we may use them as a basis of a comparison of national culture? The twofold condition is a difficulty. Typical items of culture are abundant enough—the production of good literature and music and works of art, the care of the unfortunate and dependent, the making of great discoveries and inventions; but it does not appear to be possible to put impartial and relative values on what one and another countries have accomplished in these lines. On

looking over the field there seem to be four items that combine considerable cultural significance with statistical availability. They are: the education of the young, the extent of international commerce, the development of railways, the use of the mails.

Where a large part of the young are at school, where the totals of commerce are large in proportion to the number of the people, where ample railways promote the free and rapid intermingling of citizens and where the postman comes often to the door, there culture is likely to be found in all its aspects. Fine manners and the arts have prospered where commerce was but moderate, where schooling was limited and where the railway was not, as in parts of the East to-day and anciently almost everywhere (where culture was); but the culture of the Orient is not our ideal, and in the past the seats of culture were always associated with trade and the routes of trade, always they were the site of schools of some sort.

The school must always stand for culture. In the estimates that follow it is given twofold weight among the data. The articles that the factory turns out may not be of the highest artistic value, yet the factory is an agency in a general advance toward better things, more comfort, more attention to fitness and beauty. The railroad is unquestionably a civilizing agency of the highest sort, broadening ideas and removing prejudices by bringing people together. The mails hold distant people together to such an extent that the force is largely gone from the old adage, "Out of sight, out of mind." Yet be it confessed, the value of these particular items, their special recommendation as standards of civilization lies in the fact that we have fairly accurate knowledge of them for the greater part of the earth's surface. They justify themselves as soon as we apply them by a singular harmony of evidence. Since the sort of culture we are studying is European or of European origin, let us see the facts for that continent. Here they are set out in diagrammatic form: index numbers have been calculated for schooling, commerce, railway and mail developments, and the values shown by the lengths of the black lines arranged with the longest above. The most striking thing about that diagram is that Turkey is always at the bottom and Russia as near the bottom as that allows. The two are rivals here as in other things. Servia is only a little less persistent in the third lowest place and Portugal keeps pretty well with them. Above in the list is more variation from column to column, but the groups are constant. See how England, Netherlands, Belgium and Switzerland cling to the head of the list between them, with many changes of individual place. See how France, the Scandinavian

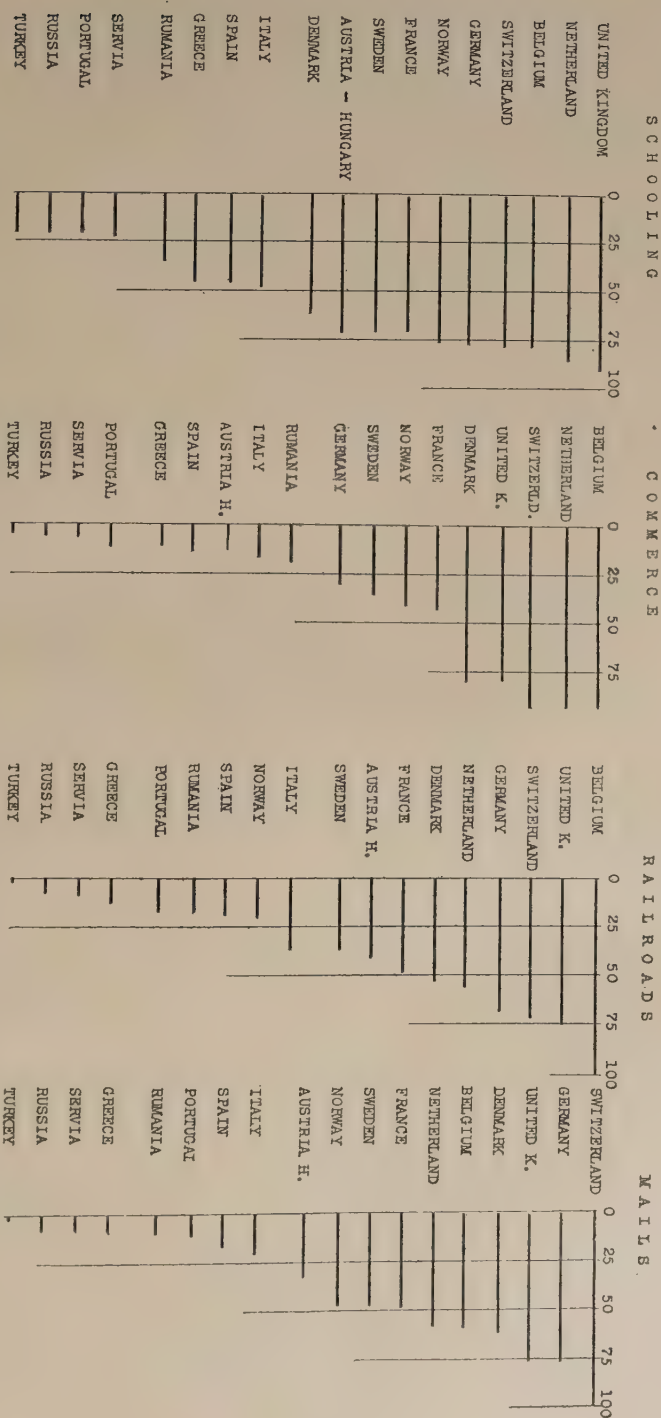


FIG. 1.—Comparative diagram of indices of European countries for schooling, commerce, railroads and mails. The countries fall into three groups and the members of each group are neighbors.

countries and Austria-Hungary affect a rank just below; and most of all, see how distinct is the length of line that corresponds to the group Italy, Spain, Greece and Rumania. Average values somewhere between 45 and 100 seem to characterize a group of nations that we may call Teutonic, values between 21 and 45 belong to purely Mediterranean lands, while the lowest group must be called Levantine. The association of these groups of nations in contiguity of values is as striking as their persistent value of index number. This will come out better if we put the data on a map of culture indices made by averaging the four values given with double weight on the schools.

Since these are data that concern people and not empty territories, the shades that are to indicate grades of culture are put only on the inhabited parts of the earth, and that is here assumed to mean the parts that have more than two and a half people to a square mile. About a twentieth part of the Canadian



FIG. 2—THE INHABITED WORLD, 1905.

Only the lined areas have as many as $2\frac{1}{2}$ people per square mile (1 per square kilometer).

territories thus becomes inhabited Canada. Similarly, we call inhabited about a quarter of Norway's 124,000 square miles and 180,000 of Chile's 308,000 square miles. Thus the blank spaces on the culture map (Fig. 3) indicate a lack of culture inasmuch as there are not people there to acquire it. To put it in another way, so thin a population as that means always that the people are fishing and hunting barbarians, save for a few groups of miners, which are small and not representative of the best things in modern life. Here we see our Teutonic people of the European diagram forming the largest group of people of the highest culture, the black area about

the Baltic and North seas. There are no less than 226,000,000 of them. As this is a world map, we are at once interested to see almost half as many more people of the same culture—a group dwelling across the Atlantic in eastern North America; Newfoundland, Canada and the United States. Another little group of 5,000,000 is found in Australia and New Zealand.



FIG. 3.—CULTURE.

<i>classes.</i>	<i>symbols.</i>	<i>indices.</i>
Teutonic.....	black	over 45
Mediterranean.....	diamonds	over 21
Levantine.....	lines	over 8
Oriental.....	dots	under 8

These indices are the sums of indices for schooling (taken twice), railroads, commerce, and mails divided by 5. The diamonds also appear in Cuba, the British West Indies and British and French Guiana.

All of the groups out of Europe are of English speech and descent. We are justified, therefore, in concluding that Western civilization culminates among Teutonic peoples the world over, and we shall call this grade of culture Teutonic. It includes all nations with culture index over 45.*

COUNTRIES OF TEUTONIC CULTURE

	INDEX.	MILLION PEOPLE.		INDEX.	MILLION PEOPLE.
1. Switzerland.....	85	4	9. United States.....	67	92
2. Belgium	84	8	10. Denmark..	65	3
3. United Kingdom,....	83	45	11. Newfoundland,	50	—
4. Netherlands.....	77	6	12. France	56	39
5. Australia	76	4	13. Sweden	52	5
6. New Zealand.....	70	1	14. Norway	51	2
7. Canada	68	6	15. Austria-Hungary.....	45	49
8. German Empire.....	68	65			

* The derivation of the various indices are explained in the following pages.

In all 329,000,000, about a fifth of the earth's inhabitants. Two-thirds of them are in Europe, centering especially on the great lowlands of the northwest, between the Scandinavian upland and the Mediterranean ridges. The four last countries on the list, the lowest of the group by the indices, occupy a peripheral position about this plain. France, which is not Teutonic, and Austria-Hungary, which is only Teutonic in part, occupy a position which is geographically as well as numerically intermediate between this group of nations and the next one.

The second group of lands, the Mediterranean ones of Fig. 1 are designated by the black diamonds on the map and are seen here in their proper geographic place. Rumania, it must be remembered, is of Latin speech though separated from its relatives by the lands still held by Turkish invaders.

COUNTRIES OF MEDITERRANEAN CULTURE

INDEX. MILLIONS.		INDEX. MILLIONS.	
1. Argentine Republic..	48 6	9. Spain.....	28 20
2. Cape Colony.....	41 2	10. Transvaal.....	28 1
3. French Guiana.....	38 —	11. Uruguay.....	28 1
4. Cuba.....	36 2	12. Greece.....	24 3
5. Italy.....	27 34	13. Natal.....	23 1
6. British Guiana.....	28 0.3	14. Rumania	23 7
7. British West Indies..	28 1.5	15. Orange River.....	22 0.2
8. Japan.....	28 48		

In all 127,000,000, a little more than half of them living in the European type area.

Italy leads this culture group as distinctly to-day as in Roman times. Spain, the second in rank, is of especial interest for its American offshoots in this same grade of culture, in the Argentine Republic and Cuba. In the British West Indies as in South Africa are seen the effects of Teutonic uplift on African peoples, at home and transplanted. Japan is a land of high and ancient Oriental culture that has in forty years made a great additional achievement in the civilization of the West, animated by a patriotic desire to win a place among the nations of the earth that her former culture had failed to secure her. Western learning, international commerce and railways are all aside from the currents of old-time Oriental life.

The East had wrought out a civilization for itself that prized other things and despised these. It is unfair to judge the East by our standards, and when we rate it low we should remember that we are practically condemning it for failure to accomplish what it

has only recently come to want. Yet Japan, the only eastern country to realize the value of western things, has made astonishing progress in the short period of her attempt. England won the freedom of the seas from the Spanish Armada in 1588, and it is only after three and a half centuries that she dwells in every continent, is at home on all the seas and is the foremost example of the culture we are studying. Japan's awakening by Perry to admit the world to commerce and acquaintance with her people came little more than fifty years ago, yet she is already a great military and naval power, has made wonderful beginnings of education and industry with merchant shipping on the oceans only inferior in total tonnage to the United Kingdom, United States, Germany, Norway and France. If her place in western culture is the moderate Mediterranean stage, her rise to that place has no parallel in the history of nations.

COUNTRIES OF LEVANTINE CULTURE

INDEX. MILLIONS.		INDEX. MILLIONS.	
1. Chile	20 4	9. Mexico	14 15
2. Ceylon.....	18 4	10. Servia.....	13 3
3. Egypt.....	17 10	11. Russia.....	11 147
4. Portugal.....	16 6	12. Paraguay.....	12 1
5. Dutch Guiana.....	16 —	13. Central America.....	10 5
6. Ecuador	15 1	14. Venezuela.....	10 3
7. Philippines.....	15 8	15. Turkey.....	9 30
8. Algeria.....	14 5		

In all 242,000,000, three-quarters of them in the Levant. The culture numbers of these countries range from nine to twenty-one.

The lowest grade of European culture characterizes 180,000,000 people in the great continuous area at the east end of the Mediterranean, from which we call it Levantine. It occurs also in Portugal, Algeria and Egypt. In America it is represented by 29,000,000 in Chile, Mexico, Ecuador, Central America, Paraguay and Venezuela, where Mediterranean Spain has by an infusion of her blood lifted native American races far above most of the countries of the Levant, though not to Mediterranean grade.

In Africa we see Teutonic influences on the native populations in Natal, much as in Ceylon and the Philippine Islands. The effects in this case, however, are by schooling and governmental control in a paternal way rather than by intermarriage.

All the extra-Europeans of this culture grade have higher numbers than European representatives. The designation Levantine is sound, however, as the origin of the culture studies is European. On the map the Levantine area is ruled with parallel lines.

Between the three culture groups of Europe, but including people outside that continent, there are nearly half the people in the world.

The remaining inhabited regions of the globe are of the lowest grades of culture, with index numbers under 9 in a possible hundred. It includes barbarous Africa between the tropics and some of the tropical lands of America, but eighty-six per cent. of its people dwell in Asia and from them we call the grade Oriental.

COUNTRIES OF ORIENTAL CULTURE

INDEX. MILLIONS.		INDEX. MILLIONS.	
1. Brazil.....	8 20	13. German Africa.....	12
2. Colombia.....	8 4	14. Persia.....	8
3. Tunis.....	8 2	15. Morocco.....	4
4. Madagascar.....	7 3	16. China.....	407
5. Peru.....	6 5	17. Minor French Africa	24
6. Bolivia.....	5 2	18. Italian Africa.....	1
7. India.....	5 300	19. Portuguese Africa..	8
8. Siam.....	3 7	20. Abyssinia.....	10
9. Dutch East Indies...	3 38	21. Afghanistan.....	5
10. Minor British Africa..	1 26	22. Congo Free State..	30
11. Korea.....	1 12	23. Anglo Egyptian Sudan.....	2
12. French Indo China...	1 18	24. Liberia.....	2

All less than 1.

In all, 950,000,000, of whom 795,000,000 are in Asia. Europe has none of this grade of culture nor has North America nor Australia. In South America are Colombia, Brazil, Peru and Bolivia with culture indices well up toward the Levantine values and far excelling the Orient proper; practically all of Africa except the extreme north and south, and in Asia, India, East Indies, Siam, Korea, Indo-China, Persia, China and Afghanistan. China reminds us again of what was said in the case of Japan. She possesses already a high degree of a culture of her own, as have some other of the countries of Asia. Only from the point of view of western civilization are they of low culture. In the conquest of natural forces and their application to the service of man the best of them have accomplished little. The Chinese are making beginnings, but statistical data are not yet at hand to show how much. Their international commerce little exceeds in gross amount that of the handful of Argentines. It is but a dollar *per capita*. Japan's is \$9 and Great Britain's \$109.

It is a matter of extreme delicacy to assign ranks to nations. This was made evident a few years ago when it was proposed to apportion votes at the Hague tribunal according to the status of the

several countries. There is much of course in the rating just proposed that is acceptable to the run of intelligent men. Afghanistan below Russia and Russia below England is probably a reasonable ranking in any eyes but those of a Russian or an Afghan. No place but the first will quite satisfy a man for his own country. But just what is the basis on which these values have been assigned? Norway will serve as an example.

It is near the foot of the group of countries of Europe with Teutonic culture, having the culture-index 51. Compare with Belgium, high among them with 84 for index. These numbers are made from the partial index numbers for schooling, commerce, railways and mails, giving double weight to schooling.

	NORWAY	BELGIUM
schooling	75	80
	75	80
commerce	40	100
railways	20	100
mails	47	59
	<hr/>	<hr/>
	257	419
	51	84

The numbers are added and the sum divided by five. It appears at once that Norway is somewhat behind Belgium in schools and mails, much behind in commerce and very far behind in railways. The last defect is easily explained. It is simple to lay sleepers and rails in a fairly level land like Belgium, immensely difficult in rugged Norway. Norway too has but 2,500,000 of people in a land eleven times as big as Belgium, which has 8,000,000. This limits the possibilities of traffic and lengthens the distances over which goods have to be hauled. Lastly, a highly developed system of communication, by small steamers in the fiords and coast waters and the inexpensive "posting" on the admirable roads, puts in the hands of the Norwegian a reasonable equivalent for the missing railroads. It might not seem amiss to modify Norway's unfavorable railway index from considerations like this. It has, however, been deemed wiser to keep the bare figures yielded by official statistics and add explanations when they suggest themselves. Norse culture is thereby depressed, but not out of the Teutonic class. It is evident that its low place is due rather to the difficulties of the land than to the disposition of the people. In commerce Norway is low, for it lies to one side of the

currents of trade and yields few products for exchange. Belgium has access through Antwerp to the world beyond the seas. On another side all Europe is open to her.

The partial index numbers have been derived as follows: Norway had in 1903 about 2,330,000 inhabitants and 350,000 children enrolled at elementary schools. Only elementary schools were examined since they alone are open to the masses of the people about whom we wish to ascertain the facts. Enrolment alone is considered since it is the only thing that can be learned for the greater part of the world. In fact, *attendance* at school can only be ascertained by the exercise of an amount of care and attention that in countries of low culture is not likely to be available. Enrolment requires only the writing down of the names of those who present themselves and their counting. Something of this sort is now done in most parts of the world.



FIG 4—SCHOOLING.

<i>indices.</i>	<i>symbols.</i>
over 58.5.....	black
over 30.8.....	diamonds
over 12.3.....	lines
under 12.3.....	dots

These indices are the percentage of population enrolled at elementary schools, multiplied by five.

From the data given above, taken from the Statesman's Yearbook, it appears that fifteen per cent. of the Norwegian people are enrolled at elementary schools. For Belgium this percentage is sixteen. As twenty is about the highest percentage to occur anywhere, an index number is made on the basis of a hundred for maximum by multiplying each value by five, giving 75 for Norway and 80 for Belgium. It is not pretended that the two numbers represent the precise relation of Norwegian to Belgian education. So many things enter into

account that it is perfectly possible that Norway might have better schools than Belgium and still have a smaller index, for our index numbers pay no heed to attendance, months of schooling, hours per day, preparation of teachers and their aims, which are of essential importance. But these things cannot be learned for any great number of countries and while small differences in an educational index such as is here described may have no significance, large ones do. In the main, where more children are enrolled, more is being done for their training than where they are left at home. American education must not be asserted to be superior to German because the index is 95 in the United States to 80 in Germany. It may be safely said to be superior to that of Spain, where the index is but 45, and the Spanish better than the Portuguese with an index of 20.

To determine the commercial index general imports and exports are used since it was impracticable to obtain the values of special



FIG 5—COMMERCE.

<i>indices.</i>	<i>symbols.</i>
over 585.....	black
over 30.8.....	diamond
over 12.3.....	lines
under 12.3.....	dots

These indices are the total general commerce per capita multiplied by five.

commerce—exports of home produce and imports for home consumption. The sum of total exports and imports is divided by the population for the same year to get a *per capita* value. The 8,000,000 Belgians have a total commerce of \$1,849,000,000; the 2,500,000 Norwegians have a total commerce of \$143,000,000; *per capita* values for Norway are \$60, for Belgium \$264. As \$150 is exceeded by only three countries we put it for a hundred and multiply all

values by two-thirds, making the Norwegian index 40, the Belgian 100. For five countries, including some of the leading culture-nations of the-world, only special commerce was ascertainable, so the culture indices may be unduly depressed by a low commercial index. There is little doubt that Germany is somewhat disparaged by our figures. On the other hand, the Netherlands is one of these countries that report special commerce only, yet their *per capita* amount reaches the astonishing sum of \$329. Netherlands being a free-trading country, however, only estimates of the commerce are given. It can hardly be doubted that this is not truly special commerce at all but much of it made up of goods in transit. For the position of the Netherlands at the mouth of the Rhine between Europe and the ocean is very suitable for transit business. There is a certain amount of what we may call "reflection" too, in the commercial data. Semi-barbarous dependencies of a great commercial nation are likely to do a good deal of business. Properly the commerce of British Guiana is British. It is therefore high—index 37—but such cases are easily recognized as they occur. The treatment of the British colonies as separate countries allows interesting comparisons. Thus the commercial indices of Australia, Cape Colony and India are 87, 43 and 2 respectively.

The United States is distressingly low. It is evident that we take very small part in the world's commerce, for our commercial index is 23. But thanks in part to the high industrial development of our country, in part to the diversity of its products, we have an internal commerce of the greatest magnitude. This is clearly shown by considering our manufactures. More than thirteen years ago the value of the product was \$136 *per capita* of our population (Mulhall). No other country had so great a value. The United Kingdom had \$109, Germany \$66. Since our exports and imports together were only \$35 *per capita*, it is evident that our manufactures were not exported. Over \$100 *per capita* of our manufactures must have been bought in the United States by our own citizens, and as it was also sold it raises our total internal commerce to over \$200. This makes no account of raw products bought and sold within our country, and intentionally, for there is no doubt that it is large for our population, if small for our acreage. In 1908 the United States, less than 90,000,000 people, produced over four billion bushels of all cereals, including rice. Europe, with 470,000,000 people, produced barely seven billion bushels; less than double the grain among five times the people. There are no usable data for total commerce of the nations, both internal and external, but it is evident from these con-

siderations that American business is largely done within our own land. Anyone familiar with the spending habits of our people as compared with Europeans, will not hesitate at this conclusion.

On the other hand, the Argentine Republic has a commercial index of 60, corresponding to a total of \$90 *per capita*. But the manufactures of the Argentines are of very modest amount and the spending, while lavish by a small class of the citizens, is very restricted on the part of the great majority. The Republic exports breadstuffs and meat and imports the products of European industry. Her foreign commerce is well nigh her total commerce. She makes an unduly good showing in our figures therefore, but the United States cannot be said to be hurt by the comparison since, when all is said, she is in the first culture group. The same facts that are evidence that the commercial index does not fairly represent her, are effective in raising her other indices. This justifies us in regarding our indices as truly significant. We stand well in the culture scale in spite of our little international commerce; the Argentines have the avenues of culture opened to them by their much buying and selling abroad.

Of railways, Belgium has 2,836 miles, Norway has 1,584. Shall we compare these mileages on an areal or a population basis? Each seems to have some advantages. More men have more resources and produce more things. They need more means of transportation therefore and can better afford them. More miles of distance, on the other hand, need more rails to overcome them as obstacles to commerce. After using both methods for some years, it has become apparent that railways serve us by overcoming space. There would be little need of railways on one square mile, however dense its population might be. Be the people few or many, the utility of a railway would not exist. A country might be well served with twenty-five miles of railway per 100 square miles of territory, like Belgium. Would it need more railroads if we doubled the population? It might need more trains per day, more speed, more tracks—Railway mileage does not count double tracks extra—but it is not apparent what advantage more lines would have when once we have enough to get pretty near every point of the territory. Suppose, on the other hand, our territory were doubled, could we get along with the railway mileage that served us before? It is plain that it must be fairly doubled to maintain the service. Railways contend with distance and we give the datum therefore in miles per hundred square miles of territory.

But when a country has broad expanses of uninhabited land, as

have Russia, Canada or Australia, only the inhabited portions are considered. The method used has been very rough. A map has been made showing the density of population of the world. The area with fewer than two and a half people per square mile (one per square kilometer) has been left white. This has been estimated and subtracted from the area of the respective countries. Any detailed railway map will justify this procedure. That of the United States, for instance, or Canada. It is true that railways cross the uninhabited spaces of these two countries, but they are few and are limited to single unbranching tracks. Australia has not yet been able to stretch her lines across the desert from Port Darwin to Adelaide, and the difference between the railway nets of eastern and western United States is very great. Evident as the thing is, political coloring of



FIG 6—RAILROADS.

<i>indices.</i>	<i>symbols.</i>
over 58.5.....	black
over 30.8.....	diamonds
over 12.3.....	lines
under 12.3.....	dots

These indices are the number of miles of railroad per 100 square miles of inhabited area, multiplied by 4.

maps has obscured the truism that a country is only where its people are. Canada is really only a portion of the valley of the St. Lawrence and its people. The lands west of Hudson Bay are Canadian territory, rather than Canada. In practical life that is what everyone means when he says Canada. It is only in schools that the extent to which the land is in use is ignored, and the whole territory spoken of as if all of it were the home of the nation. Now Norway is the land of empty spaces. The government reports that only four per cent. of the area is fit for cultivation. There are vast expanses of rock

and snow. It has been estimated very conservatively for our purpose that three-fourths of the kingdom was unsettled, reducing its area to 31,000 square miles. There are five miles of railway for every hundred square miles. For Belgium, which is all settled and densely, the mileage is twenty-five, the highest in the world. To obtain an index number, similar to those for education and commerce, this maximum has been put equal to 100 and all railway numbers, obtained by dividing the total mileage by the hundreds of inhabited square miles, have been multiplied by four to bring them to this basis, giving 100 for Belgium and 20 for Norway.

In Norway 67 pieces of mail matter are delivered annually for each head of the population, in Belgium 85. As the greatest number in any country in the world is 143 in Switzerland, we put that for



FIG 7—MAILS.
indices. *symbols.*
 over 58.5.....black
 over 30.8.....diamonds
 over 12.3.....lines
 under 12.3.....dots

These indices are the number of pieces of mail delivered annually per capita, multiplied by 0.7.

100 by multiplying all values by seven-tenths. Thus the mail indices become for Norway 47 and for Belgium 58.

It was interesting to the writer to come on the mail data after the culture indices had been once computed on the basis of the other three items only. But the special interest was that inclusion of the mails as basal data for culture caused no material change in the results. Indices were of course changed a little, but only one, Natal, suffered change enough to move out of its culture class. This fact can only be regarded as a confirmation of the reliability of the method used for the sort of conclusion here drawn.

Here are all the indices for the 69 countries studied:

	CULTURE.	SCHOOLS.	COMMERCE.	R.R.	MAILS.
1 Switzerland.....	85	80	95	72	100
2 Belgium.....	84	80	100	100	58
3 United Kingdom.....	83	90	80	76	77
4 Netherlands.....	77	85	100	56	58
5 Australia.....	75	100	87	18	68
6 New Zealand.....	70	85	100	10	68
7 Canada.....	68	100	62	40	37
8 German Empire.....	68	80	30	68	81
9 United States.....	67	95	23	44	80
10 Denmark.....	65	65	80	52	61
11 Newfoundland.....	57	75	67	64	4
12 France.....	56	70	42	48	49
13 Sweden.....	52	70	35	36	49
14 Norway.....	51	75	40	20	47
15 Austria Hungary.....	45	70	13	40	33
16 Argentine Republic.....	43	50	60	9	45
17 Cape Colony.....	41	65	43	14	19
18 French Guiana.....	38	40	80	0	31
19 Cuba.....	36	40	76	13	13
20 Italy.....	33	47	16	36	20
21 British Guiana.....	28	50	37	0.4	4
22 British West Indies.....	28	50	30	9	0.3
23 Japan.....	28	55	6	12	15
24 Spain.....	28	45	13	19	16
25 Transvaal.....	28	15	95	6	10
26 Uruguay.....	28	35	40	7	22
27 Greece.....	24	45	11	12	8
28 Natal.....	23	15	38	9	36
29 Rumania.....	23	35	19	16	10
30 Orange River.....	22	20	60	6	2
31 Chile.....	20	25	31	6	15
32 Ceylon.....	18	35	11	8	3
33 Egypt.....	17	10	21	44	3
34 Portugal.....	16	20	11	16	11
35 Dutch Guiana.....	16	15	35	0	13
36 Ecuador.....	15	30	10	0	5
37 Philippines.....	15	35	5	0.4	0.7
38 Algeria.....	14	20	17	4	8
39 Mexico.....	14	20	11	9	9
40 Servia.....	13	22	6	8	8
41 Russian Empire.....	12	20	4	7	8
42 Paraguay.....	11	20	11	1	2
43 Central America.....	10	20	8	4	0.4
44 Venezuela.....	10	20	6	1	2
45 Turkey.....	9	20	5	1	1
46 Colombia.....	8	18	3	0.4	0.7
47 Brazil.....	8	10	13	5	3
48 Tunis.....	8	5	17	4	10
49 Madagascar.....	7	15	3	0.2	0.7
50 Peru.....	6	10	7	1	2
51 Bolivia.....	5	10	3	0.2	0.6
52 India.....	5	7	2	6	1
53 Siam.....	3	4.5	5	0.4	0.2
54 Dutch East Indies.....	3	3	4	2	0.6
55 Minor British Africa.....	2.2	2.5	3	0.8	—
56 Korea.....	1	0	1.3	4	0.1

	CULTURE.	SCHOOLS.	COMMERCE.	R.R.	MAIL.
57 French Indo China.....	1	0	3	1	0.4
58 German Africa.....	1	1.5	1	0.2	—
59 Persia.....	0.6	0	3	0	0.2
60 Morocco.....	0.6	0	3	0	—
61 China.....	0.6	0	0.7	2	0.1
62 Minor French Africa.....	0.4	0.5	1.3	0.1	—
63 Italian Africa.....	0.4	0	2	0.1	—
64 Portuguese Africa.....	0.4	0	2	0.1	—
65 Abyssinia.....	0.1	0	0.7	0	—
66 Congo State.....	0.1	0	0.3	0.1	—
67 Afghanistan.....	0.1	0	0.7	0	—
68 Anglo-Egyptian Sudan.....	0.1	0.2	0	0.1	—
69 Liberia.....	0.1	0	0.3	0	—

If anyone should find such a page of figures annoying rather than convincing, from a feeling of distrust of figures as capable of supporting any conclusion desired, let him remember that there are some sorts of figures that all of us have to admit to our confidence in modern life, such as those of the assessor or the bookkeeper at our bank. We cannot successfully refuse recognition to them. We know that when we set ourselves to it they can be verified. We can establish their truth or falsity. Now we have by no means so lively an interest in the culture status of the nations as in our taxes or our balance at the bank, but we have an opinion about that status which we use in our habitual thought of fellow nationalities, and it is only fair play and justice to take some reasonable effort to see that our opinion is well founded. In general, unless we have traveled very widely and actually lived in different lands long enough to appreciate their good points as well as the obvious differences from our ways, such opinions are not at all well founded and the present argument pleads for the substitution of solid facts as a basis.

The figures here given are entirely verifiable. Back of the general table at p. 264 is the Statesman's Yearbook, and, for the mail data, Hickmann's geographical statistical Pocket Atlas (Freytag, Leipzig). If a sample country or two from the list be tested the solidity of the facts here adduced will be established.

A scrutiny of the list of culture and partial indices reveals the fact that for any country disagreements of a single index with its fellows may usually be understood. In the first class the low commercial index of the United States has already received comment. So has Norway's low railway index. Low railway indices for Australia and New Zealand are doubtless consequent on the newness of the lands. New Zealand is not all inhabited, and on that score is entitled to a reduction of territory that it has not received, as the detailed distribution of population is not known. Newfoundland's

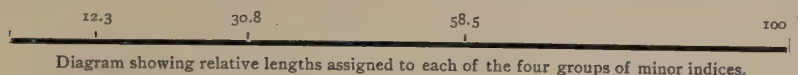
lead in railways is of slight cultural significance. Her 666 miles of "government" railway have been built to assist the development of the island rather than in response to it. That was the necessary number of miles to get across the island. In the second group French Guiana and the Transvaal have abnormally high commercial indices. Both are gold exporting countries and both have their mines developed by foreign capital. Of Japan's commercial index we have already urged that it be regarded as a step in an amazingly rapid progress than as a low status. Small railway indices somewhat uniformly characterize South America, for which the rugged country is reason enough in the Andine republics.

In the Levantine class Egypt has extraordinary railway development, due perhaps to the peculiarly level, watered land along the Nile. In the Philippines the country is rough and the American occupation too new for railways or commerce to have much development as yet. Public education has already been imposed on a considerable number. The Guianas have only coast development, so railways are hardly in the scheme of things for them as yet. Ecuador has the Andine difficulty already referred to.

The Oriental class shows the best accordance of all. Colombia's educational index does not mean very much, for statistics are not a fixed habit in that republic.

The first maps prepared in this work were those showing the partial data for education, commerce and railways. Inspection of the indices showed a preponderance of low values. Of our 69 countries 49 had indices under 50 per cent. for schools, 55 for commerce and 62 for railways. This is partly due to the fact that some twenty countries at the bottom of the list hardly show stirrings of modern civilization (eleven are subject states), and partly because growth in culture is self accelerating. A country that enters resolutely in the way of progress finds it grow upon her. A ship, a school, a mile of railway is a mighty argument for a second. Thus progressive countries step rapidly apart from the backward ones. So our scale of a hundred units has been divided into four unequal divisions of $41\frac{1}{2}$, 27.7, 18.5 and 12.3 respectively, starting at the top of the scale. In this series each upper number is one and a half times as great as the next below, tending to bring a greater number of countries into the upper divisions. The highest group contains all countries with indices between 100 and 58.5, the next those between 58.5 and 30.8, then 30.8 to 12.3 and 12.3 to 0. In this subdivision of the 69 countries the indices bring 40 into the two lowest classes for

schools; 46 for commerce and 39 for railroads, a better showing than the above.



In the case of the general culture map the strict values have not been kept, but modifications introduced by seeking to divide the series of indices at the points where the greatest differences of value occur between European countries on the diagram Fig. 1.

The map of the distribution of elementary education shows distinctly the same groupings as the general culture map, except that Cape Colony is added to the Teutonic class, the Philippines and Ceylon to the Mediterranean, from which Transvaal and Orange River have been depressed. Colombia has been, somewhat doubtfully, lifted into the Levantine from the Oriental class, into which Egypt has been depressed. England does not attempt to take control of Egypt's schools as the United States those of the Philippines, evidence of the good faith with which she administers Egypt without attempting to make her English. These are few divergences, but it must be remembered that schools entered into the general culture values with twofold weight. The other data should show greater differences.

The commercial map shows them. Cuba, French Guiana, The Argentine Republic, Transvaal and Orange River join the countries of the first class, in which Norway, Sweden, Germany, France and the United States do not here appear. Austria-Hungary is commercially out of the highest or any Teutonic class and joins the Mediterranean nations. The Levant generally has commercially speaking become Oriental. This is true of railway development also. Here Britain, Belgium, Germany and Switzerland make the first class, mainly Teutonic, and the Netherlands, though not in this class, has a canal equipment that more than restores her to a place in it, if transportation in general be considered. Norway, Sweden, Austria and France form a second part-Teutonic group, in which Italy is included, putting her this time above the class of her Mediterranean neighbors, which she always inclines to lead.

But if culture is European and its distribution well enough indicated by the names Teutonic, Mediterranean and Levantine, how is it with the western continent? The relations there are set out on the diagram Fig. 8. It is plain that America has two cultures, Teutonic and Latin, divided at the Rio Grande. This is absolutely in accordance with the teachings of economic and historical geography.

Latin America is led by the Argentine Republic, with Uruguay closely following, if the small European colonies are passed over, and Cuba, stimulated by the United States. The Argentine Republic not merely leads Latin America but it is a very long lead, fifteen points ahead of her neighbor Uruguay and twenty-three ahead of Chile. Moreover, she is ahead of all European nations of this class, lacking little for admission to the Teutonic. She is only a little more behind the United States than she is ahead of Chile.

The second group for Latin America, Levantine, to use the European term, consists of Chile, Ecuador, Mexico, Paraguay, Central America, and Venezuela. If we admit a doubt about Ecuador and Venezuela which a very brief study of the state of statistics in those lands will justify, the group consists of the subtropic lands of America.

Within the tropics we have only nations whose culture is of the Oriental class. The condition of Brazil and the Andine republics is extremely backward. Brazil and the five mountain states, Bolivia, Peru, Ecuador, Colombia and Venezuela together claim over 30,000,000 people. All combined they have only \$512,000,000 worth of commerce. The Argentine Republic alone has \$545,000,000 of commerce, with less than a sixth as many people. It is true that southern Brazil, if it could be studied apart from the rest of the country, would show another state of affairs, but that concerns only a minor part of the whole Brazilian people, and in Europe, too, there are many great differences within the countries described, as Ireland and England, Rhenish and Prussian Germany. So far we cannot go. The figures just quoted justify what is familiar to those who have gone among the Latin-American peoples. Within the tropics life has been facilitated by the mountain climate, but this has not seemed to possess a stimulus to human exertion or accomplishment. What one sees in the larger cities might be described as veneer and vice. That is unfair to great numbers of worthy men and women, but it is not without foundation in fact.

A striking feature of the classification attained here is that the rank of the four culture groups is inversely as their age in history. The low Oriental stage prevails in the seats of the oldest historic civilizations. The Levantine reminds us of Egypt, Persia and Greece; the Mediterranean of old Rome, and the now dominant Teutonic, of the revival of learning and the passing of power along with science and letters to the north of the Alps. Is culture continuing a westward journey around the world, like the path of empire? Have those old nations learned their modicum of civilization, only to

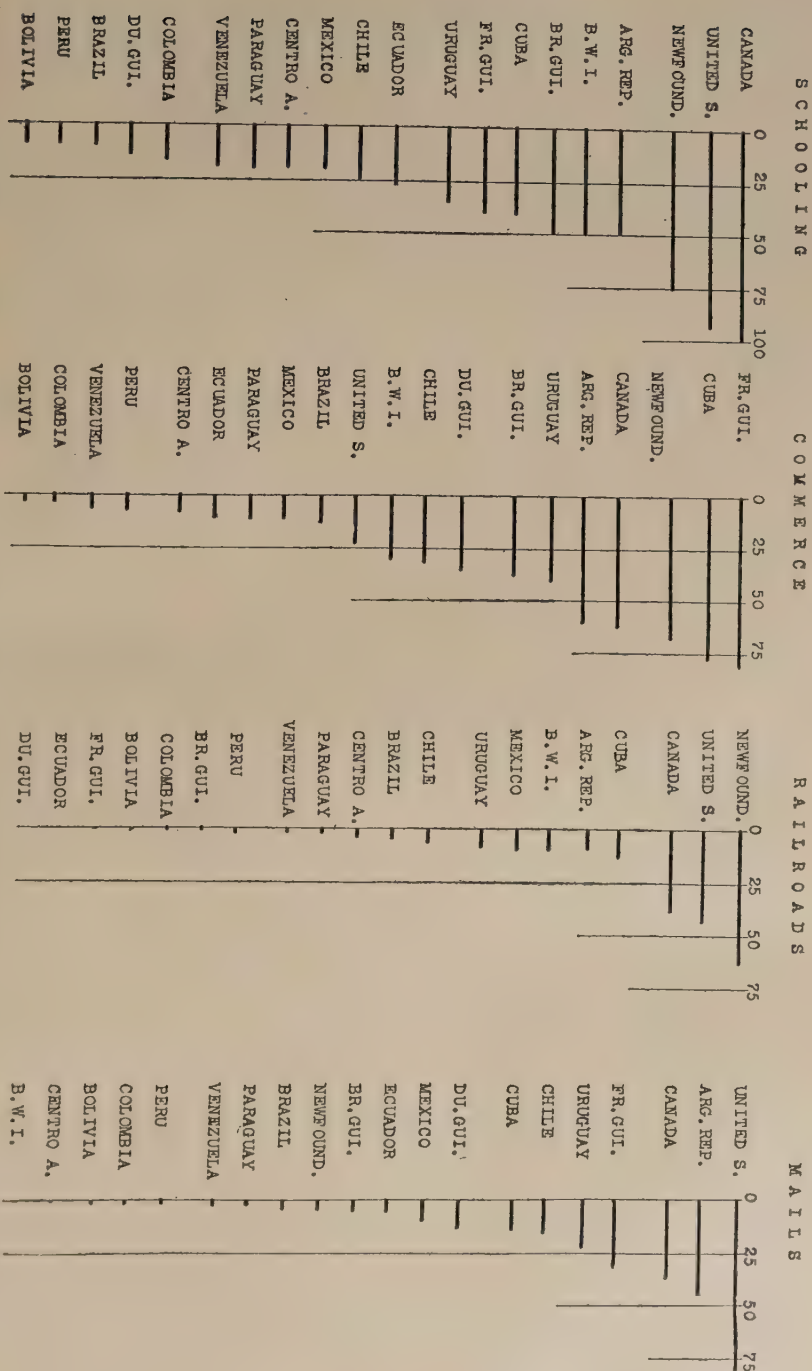


FIG. 8.—Comparative diagram of indices of American countries for schooling, commerce, railroads and mails. The countries fall roughly into groups.

stagnate afterwards for a thousand years while others carried further the same work of human uplift? Or is it to be again possible for them to take up man's burden of the conquest of nature? Japan, long of Oriental grade, is rising now into competition with Teutonic lands on their own plane. Is it going on into first rank? Are Teutonic nations in an area of stagnation from the standpoint of progress in civilization? Have they wrought out with their intellects plans they have not will to realize? And is Japan now in process of imitation by her immense continental neighbor? If Japan reaches high levels in a culture of the Teutonic cast, it is safe to predict it will not be on her present soil, more niggardly of sustenance space than any land but Norway. Have other races right to maintain property in great empty spaces that might serve man's uses while a virile people like Japan's are huddled and constrained on their narrow fields of available soil? Poverty and progress are bad neighbors, and poverty hangs heavy on the Orient to-day, the poverty of scanty, costly lands.

Will any mental or governmental process relieve Asia of the handicap of an overcrowded soil? The wealth of the nations would be a splendid basis for a study of their comparative culture. Much of the westward progress of Empire has been a seeking of new lands. But it has not always been to the west. When Australasia offered the Englishman new lands in the East, he did not hesitate to move east to occupy them. So the Russians are expanding eastward into Siberia, and the greatest step in Spain's conquest of Latin America was her moving eastward across the Andes in Bolivia and Chile into the plains of the Argentine in 1575. Europe looks doubtfully at the culture of the new world. It has done so many material things; has it appreciated those of the spirit? But even such is the Orient's question of European culture: is it not material largely? Yes; the material mastery of natural forces is the foundation of western wealth and of the leisure and culture built upon it. Not railways, not schools, not commerce, as they are to-day, made a Shakespeare possible, for they had not come. But a people in a culture stage that was to bring all these things presently, is what made, not Shakespeare, but the possibility of him.

And now, we must ask, how sound is the argument that has reared up all this structure on our basis of statistics? The best confirmation appears in the accordance throughout geographical or historical spaces of the inferences drawn from data supplied by political units only. The chance that throws all the North Sea shores into one class, those of Mediterranean Europe into another and the Levant into a third, while dealing with data gathered from the offices of

eighteen European governments, where was no thought of such an application of them, is no chance at all, but the working of cause and effect. We have used what came to hand as a statistical base, and we have come into confidence that, had we data about more typical aspects of culture, we should find them in accordance with the classification that has resulted. If we could know the consumption of soap in every land, we should either see confirmed Liebig's dictum of its proportionality to civilization or learn why not. We expect high consumption in Teutondom, less high in the Mediterranean, low in the Levant and well-nigh none in the Orient.

Two items that may become accurately available in the near future are the production of new books and new inventions. The difficulty to-day is the lack of common agreement in defining a book or an invention. Germany, claiming the enormous output of 30,000 books a year, counts leaflets, circulars and pamphlets. Swiss data distinguish as books volumes of at least 100 pages, though pages vary widely in content. A search through the pages of the *Publishers' Weekly* for the last year justifies the following as the best list of books and new editions for the years 1907 or 1908. The Russian data almost certainly include many pamphlets, which have been excluded for countries where any hint as to their number exists. In Germany, for instance, it is assumed on not very sufficient grounds that these numbered 17,000.

	BOOKS.	BOOKS PER MILLION.
Switzerland.....	3,085	855
Belgium.....	2,107	466
Netherlands.....	2,400	414
France.....	8,800	225
United Kingdom	9,820	223
Germany.....	13,000	207
Italy.....	3,500	203
United States.....	9,250	108
Russia.....	9,700	76
Uruguay*.....	50	50

* Includes pictures and copyright music.

While Mediterranean countries are not well represented in this list, the book-trade is. There is no doubt that most books are published in the countries named and that the Teutonic class leads here as in other things.

GENERAL TABLE.

	—THOUSANDS—		TOTAL EXPORTS AND IMPORTS IN MILLION DOLLARS.	MILES OF RAILROAD.	THOUSANDS ENROLLED AT ELEMENTARY SCHOOLS.	INHABITED AREA THOUSANDS SQ. MILES.	PER CENT. OF POPULATION AT SCHOOL.	MILES RAILROAD IN 100 INHABIT- ED SQ. MILES.	DOLLARS COMMERCE PER CAPITA.	PIECES MAIL DE- LIVERED PER CAPITA.
	SQ. MILES	PEOPLE								
United States.....	2970	6 83941	6 2970	5 217341	5 15788	2000	19	11	35	120
Canada.....	3747	1 5371	6 551	5 20601	4 1115	200	21	10	93	53
Newfoundland.....	40	4 223	6 20	6 666	4 34	4	15	16	100	6
Mexico.....	767	0 13606	6 246	6 13515	4 620	600	4	2.2	16	13
Central America.....	169	4103	5 50	4 874	1 136	128	4	1.	12	0.6
British West Indies....	13	1657	73	301	179	—	10	2.3	45	0.4
Cuba.....	44	99 1573	5 216	5 1479	4 143	—	8	3.4	114	19
Argentine Republic....	1136	5 5678	5 545	5 12274	5 544	560	10	2.2	90	64
Bolivia.....	708	6 2268	5 25	5 884	4 49	500	2	0.06	11	9
Brazil.....	3219	0 17371	5 374	5 10408	3 (347) 731	731	*	1.4	20	4
Chile.....	309	3 3206	5 163	6 2950	3 167	180	5	1.6	46	21
Colombia.....	445	5 4280	4 20	4 411	3 (154) 300	300	* 3.6	0.1	5	1
Ecuador.....	116	(1206)	18	?	68	70	6	?	15	7
Guiana, British.....	90	5 303	17	104	(30)	—	10	0.1	56	6
Dutch.....	46	4 75	4	0	2	—	3	—	53	19
French.....	30	1 33	4	0	2½	—	8	—	121	44
Paraguay.....	98	5 631	10	156	25	50	4	0.3	16	3
Peru.....	696	06 4610	5 51	5 1146	3 105	420	2	0.3	10	3
Uruguay.....	72	4 1038	5 62	6 1210	3 76	72	7	1.7	60	31
Venezuela.....	364	5 2602	4 24	3 540	3 (112) 250	250	* 4	0.2	9	3
Australia.....	2973	5 4053	6 555	5 14768	5 829	323	20	4.6	130	97
New Zealand.....	105	6 936	5 138	6 2520	5 158	105	17	2.4	153	97
Afghanistan.....	250	(5000)	7	0	0	—	0	0	1	—
Ceylon.....	25	1 3578	5 5	5 561	5 263	—	7	2	17	4
China.....	1532	(407000)	5 557	5 3700	(?) 700	700	?	0.5	1	0.2
Dutch East Indies.....	736	(36000)	4 235	5 2950	4 215	—	0.6	0.4	6	0.9
French Indo China.....	256	18230	72	530	20	—	0	0.2	4	0.6
India.....	1767	1 294361	1145	28295	5 4330	—	1.4	1.6	3	2
Japan.....	161	5 47812	420	5014	5 5154	—	11	3.1	9	22
Korea.....	82	(12000)	5 30	6 612	?	—	0	1	2	0.1
Persia.....	628	81 7653	5 50	6 6	?	—	0	0	5	0.3
Philippines.....	128	3 7635	5 63	6 190	5 515	—	7	0.1	8	1
Siam.....	220	4 6687	5 50	5 395	61	—	0.9	0.1	7	0.3
Abyssinia.....	200	(10000)	6 11	0	?	—	?	0	1	—
Morocco.....	219	(4500)	5 21	0	0	—	0	0	5	—
Anglo Egyptian Sudan.....	950	6 (2000)	?	150	6 1	—	1/20	0.02	7	—
Cape Colony.....	277	4 2410	5 160	5 3893	4 316	111	13	3.5	64	27
Egypt.....	400	97 9734	6 300	5 1455	97 174	13	2	11	31	4
Natal.....	35	4 1109	5 63	5 818	5 30	—	3	2.3	57	51
Orange River Colony.....	51	4 387	5 35	5 797	6 16	—	4	1.5	90	3
Transvaal.....	111	4 1270	5 186	5 1788	6 43	—	3.4	1.6	143	14
Minor British Africa.....	1588	4 26312	5 99	5 3280	105	137	½	1	4	—
Algeria.....	344	6 4740	122	1940	160	159	4	1.2	26	12
Madagascar.....	228	4 2645	11	92	3 66	—	3	0.04	4	1
Tunis.....	65	(1900)	5 30	597	4 20	—	1	1	26	14
Minor French Africa.....	3296	(24331)	5 47	1009	31	—	1/10	0.03	2	—
Congo Free State.....	900	(30000)	5 14	300	0	—	?	0.03	½	—
Liberia.....	45	(2000)	1	0	?	—	?	0	½	—
German Africa.....	931	12210	19	417	40	609	3/10	0.07	1½	—
Italian Africa.....	188	850	3	48	0	—	0	0.03	3½	—
Portuguese Africa.....	798	8206	23	307	0	—	0	0.04	3	—
Austria Hungary.....	241	0 45405	5 889	4 24148	4 6558	—	14	10	19	47
Belgium.....	11	5 7161	5 1849	4 2836	4 1114	—	16	25	264	85
Denmark.....	15	6 2605	5 312	5 1993	5 330	—	13	13	125	87
France.....	207	6 39252	6 2472	4 24755	4 5417	—	14	12	63	70
German Empire.....	209	5 60641	5 2766	4 34669	1 8925	—	16	17	45	115
Greece.....	25	3 2645	5 45	4 700	2 233	—	9	3	16	12
Italy.....	111	6 33733	798	6 10070	2 3090	—	9½	0	24	28
Netherlands.....	13	5 5592	5 1845	5 1817	5 967	—	17	14	329	33
Norway.....	124	0 2240	4 143	6 1584	3 850	31	15	5	60	67
Portugal.....	35	0 5423	5 95	5 1530	3 240	—	4+	4	17	16
Rumania.....	51	99 5997	5 150	5 1974	4 474	—	7	4	29	14
Russian Empire.....	8648	97 129194	5 1007	1 40748	3 5345	2457	4	1.7	7	11
Servia.....	19	5 2689	26	4 394	4 122	—	4½	2.1	9	11
Spain.....	190	0 18618	6 381	6 9190	1 1617	—	9	4.8	19	23
Sweden.....	173	5 5295	5 279	3 7677	4 727	86½	14	9	53	70
Switzerland.....	16	5 3464	5 493	5 2936	4 537	—	16	18	142	143
Turkey.....	158	0 30000	1 168	5 3637	1331	—	6	0.3	7	1.5
United Kingdom.....	121	6 43659	6 5167	5 22847	5 7587	—	18	19	110	110

* General table of data used, mostly from the Statesman's Year-Book. The small numbers to the left in columns 2, 3, 4 and 5 are the dates of the data. In some cases, Canada, for instance, the dates are not the same for population and commerce. If the numbers printed were used to obtain the *per capita* commerce, too large a value would be obtained, since the population of 1901 was smaller than that of 1906. We should have obtained 102 dollars *per capita*. In each such case an estimate was made of the population for the year in question. The sixth column—inhabited area—gives values *only* when a reduction is made for lands possessed by the nation, but not inhabited by it with more than $2\frac{1}{2}$ people to the square mile. When no such reduction is necessary, the first column of numbers gives the area. Some countries, like Congo State, have need of such reduction, but in our ignorance of the distribution of people in Central Africa, we have not attempted it. Of course there are practically no railroads and no present need of the datum.

The division of the world into 69 countries is of course arbitrary. Bulgaria, for instance, has as much right to be included as Rumania or Servia. It was simply overlooked when the first list was made. It is interesting now to see that its culture number is 21, just below the Mediterranean grade and at the head of the Levantine, as the place of the country on the map demands. Computation for Cyprus, Finland and Porto Rico has been made, getting the numbers 25, 24 and 17, which will be seen to fit well with the data mapped.

POLYNESIAN WANDERINGS*

A REVIEW

BY

S. PERCY SMITH, F.R.G.S.

President of the Polynesian Society

In what consists the ever constant interest in the handful of people that comprises the Polynesian race? Ever since Wallis, Cook and Banks made known to the world, in the last quarter of the eighteenth century, the existence of this people, with much and valuable information of a scientific nature regarding them, this interest in them has grown, and is still a powerful attraction to all who have ever come in contact with them. The answer is, no doubt, the mystery that surrounds their origin, their intelligence, their charming personality, and—one likes to think—their common source with ourselves from the Caucasian branch of humanity, which induces in us a feeling of sympathy and affection above that felt toward any other colored race. Their intelligence is of a high order as compared with other peoples in the same plane of culture, and this is proved by the fact that many of those whose grandfathers were savages and cannibals are now found holding their own with our people at the universities, in politics, etc., quite a number holding high degrees, and competing with our older civilization in the professions of law, medicine, the Church, etc. It was this high intelli-

* The Polynesian Wanderings. Tracks of the Migration Deduced from an Examination of the Proto-Samoan Content of Efate and other Languages of Melanesia. By William Churchill. viii and 516 pp., maps, appendices and index. The Carnegie Institution of Washington, 1911.

gence that enabled the ancestors of the present people to become one of the leading races of navigators at a period when our ancestors had not emerged from the stage of coastal voyagers. Our author, in the work we are about to discuss, does not touch on this question in detail; it was not necessary to his purpose so to do; he necessarily treats it as taken for granted. It is nevertheless difficult for those who have had no personal knowledge of the people and their well preserved traditions, to believe that the Pacific Ocean, from New Guinea to Easter Island in the far east, from the Hawaiian Islands to New Zealand, distances approximately of 6,000 and 3,500 miles, was completely known, and the sailing directions for each island duly recorded by the learned men of each division. Before me as I write lies a list of eighty-five islands known to and discovered by these people in the seventh, eighth and ninth centuries, and the record in which these are found adds that "the half of them are not told." With their known powers of traversing long distances of ocean, it is not at all beyond the bounds either of possibility or of probability that these daring voyagers saw the west coast of America, centuries before Columbus or Cabot discovered the eastern shores of the two continents.

But in this connection we are concerned with the migration of the Polynesian people from the west. There are several ways of attempting to solve the mystery of their origin; for instance, the traditions of the people; the comparison of their manners and customs with those of other races; the physical structure of the race; the linguistic, etc. Mr. Churchill attacks the question from the latter standpoint, and that he has gone into it more deeply than any of his predecessors is very apparent by the large amount of data he supplies and on which his arguments are based—indeed it is only within the last few years that the wealth of philological matter relating to the Polynesian language, and, to a much less extent, to that of the Melanesian, has become available. Not only has the author considered this question as indicated by the study of the two languages just mentioned, but he has extended his researches into those of Indonesia, where abundant material exists. It has frequently been held that language is by no means a safe guide to identity of race, but on this point opinion varies to opposite extremes; its value largely depends on the manner in which the question is dealt with. A late authoritative opinion on this subject may be quoted here: Prof. William Ridgeway, Sc. D., in his presidential address to the Royal Anthropological Institute of Great Britain, delivered on Jan. 25, 1910, says, in discussing more particularly the question

of environment as affecting race history: "Finally, I was led to the conclusion that language, when once we realize the laws that govern its borrowing by one race from another, may be taken as a test of race really as the surest when dealt with broadly and over wide areas, and not merely in the way of guesswork etymologies in the case of isolated words." There seems to us no question that our author has treated his subject in the manner indicated by President Ridgeway.

The general conclusion at which the author arrives after a most exhaustive study of the available data, does not differ from most of his predecessors in the tracing of the migrations from Indonesia. Beyond that he does not carry his investigations. But his book adds fresh evidence to the course of the migrations, on which his linguistic studies throw much light and enable him to add much detail on the intercourse between Melanesian and Polynesian as the latter people passed down the eastern shores of that long chain of islands extending from New Guinea to Viti and Samoa, to which latter groups and others surrounding them he gives the name of Nuclear Polynesia. This is a convenient term when we consider the important and very early part its people have played in sending off from their shores the many pioneer expeditions that have peopled the rest of Polynesia. It is to be noted, however, that the Polynesians themselves have a name for these groups which is expressive and from which a good deal of their history may be deduced. This name is *Hawaiki-raro*, or *Leeward Hawaiki*, in contra-distinction to *Hawaiki-runga*, or *Windward Hawaiki*, a name that includes Tahiti and the neighboring groups. They are derived from the fact of the trade-wind blowing from an easterly direction. The name *Hawaiki** itself is that of the most ancient home of the people of which they have traditional knowledge, and that this traditional home was a continent rather than an island there is much evidence.

The author's linguistic studies confirm in a remarkable manner the traditional belief in a two-fold—perhaps, in truth, a manifold—exodus from Indonesia, to which he gives (p. 45) the appropriate names of "Proto-Samoan" as representing the very earliest migration into the Pacific now best represented by the Samoans; and "Tongafiti," applied by the islanders themselves to that element of the race which subsequently developed into the Hawaiian, Tahitian, Paumotuian, Marquesan, Rarotongan and New Zealand branches. It is the first of these movements with which this book especially

* This is the Maori or New Zealand form of the word; it varies dialectically as *Savai'i*, *Avai'ki*, *Havaii*, *Hawaii*, etc.

deals, and the author has devoted a very considerable portion of it to showing the linguistic evidence of Proto-Samoan contact with the Melanesian Islands to the exclusion of the Tongafiti or later migrations altogether, which, therefore, would appear to have followed a somewhat different route after they once entered the Pacific. What these routes were it is somewhat difficult to say, for while the "log-books" of the Tongafiti migration are full of the names of places at which the fleets called, the most of them (with the exception of one referred to later) are unrecognizable at the present day owing to the fact that the names of the islands have been changed since the migrations passed by them or left colonies on them. On the chart that accompanies the work an ingenious system of linguistic contour lines is shown, indicating graphically the results obtained from the large amount of tabular comparisons of words, showing by numbers on the lines the proportion of words common to Melanesian and Polynesian. From this chart the course of the Proto-Samoan and the Viti stream of migration are plainly seen, as suggested by the linguistic contact. The author would be the last to deny the possibility of change in some of these contour lines (and derivatively therefrom, lines of migration) whensoever we shall possess fuller information as to the Melanesian languages, for up to this date Dr. Macdonald's "Efaté," and the Rev. John Inglis' "Aneityumese Dictionaries" (both New Hebrides dialects), together with the dictionary of the Mota by Codrington and Palmer, are the only works that treat of that group of languages at all completely in the dictionary form, whilst Dr. Codrington's "Melanesian Languages" deal with the form and structure of the languages as a whole. The rest of Melanesian speech is comprised up to the present in brief vocabularies. It is perhaps scarcely necessary to add that it is far otherwise with the dialects of Polynesian, of which there are many excellent dictionaries, and one comparative dictionary of the whole language by Ed. Tregear.

Dr. Macdonald's Efaté dictionary has furnished the author with a theme that runs like a thread through a large part of his work. Dr. Macdonald is the expositor of a theory which endeavors to make the Polynesian and Melanesian speech a close kin of the Semitic languages. Our author has devoted a considerable amount of trouble to exposing the fallacy of this theory, and it seems to the common sense man that he has succeeded, while at the same time acknowledging the excellent work in Dr. Macdonald's dictionary.

The author deals exhaustively with the theory originated by Dr. Thilenius, which advocates a more easterly route for the migrations

by way of the Gilbert, Marshall, Union, Ellice and other groups to Nuclear Polynesia, and holds that the prevailing direction of winds and currents would prohibit their following the route coasting the Solomons, New Hebrides and Fiji groups to the same parts. Our author combats this theory and shows at great length the ability of the old Polynesian canoes to face the trade winds whenever the occasion arose. He sees in the inhabitants of the fringing and smaller islands in the space he terms "the Polynesian verge"—occupied almost exclusively by Polynesians or by Melanesians much mixed with the former—a proof of the coastal route adopted along the Solomons, New Hebrides, etc., by the Proto-Samoans. He comes to the conclusion, as many of us have done, that this range of off-islands east of the Solomons was settled by Polynesians on their route to the south, and not by stray parties blown from islands to the east, which are, and appear always to have been, occupied by Polynesians.

The linguistic chart already referred to shows with tolerable certainty that the Proto-Samoan migration must have coasted the Solomons and Santa Cruz group by sailing close-hauled to the south-east, and thence to the Viti Archipelago. To enter into the question why these Proto-Samoans, with their civilization superior to that of the Melanesians, did not expel some of the latter from their homes and occupy them themselves, would lead us too far beyond the limits of a review. But there is a reason why this migration so closely hugged the trade wind blowing from the Viti group which is not mentioned by the author, and yet, inquiry will probably show, as it has done in other instances, that it was the flight of land-birds that ever caused these bold sailors to struggle to windward to reach the land their acute observation of nature led them firmly to believe lay in the direction whence the birds came.

It was thus that New Zealand, so very far distant from those parts of the ocean traversed and retraversed by these able voyagers, was first discovered. There are three species of birds which annually visit New Zealand from the Pacific islands, Australia and far beyond—even so far away as the tundras of Siberia—and these have been the pilots that led to the discovery of many a Polynesian island. We hold that the flight of birds has been an all important factor in inducing the struggle of the migrations against the prevailing winds; and the inclusion of this idea in the author's description of the "close-hauled" course of the canoes from the Santa Cruz and New Hebrides groups to Viti, would have relieved the somewhat labored argument necessitated by the obstruction of the trade wind to the southeast-

erly course actually followed, and in which many writers not acquainted with the powers of Polynesian craft, have seen a serious objection to the westerly origin of the migrations. The southeasterly trade winds do not, however, blow constantly; from October to March there is much variable weather, with frequent northerly and northwesterly winds, which would be taken advantage of by such acute observers of nature. And, moreover, the people were accomplished in the use of the paddle with which they would constantly face contrary winds.

In Chapter VIII. the author deals with the question of the Indonesian contact with Polynesian speech, but does not give to it so much consideration as has been devoted to that of the Melanesian, for the sufficient reason that * * * "this speech area has its own diligent students, and to their researches we owe the present advanced state of our knowledge of the multiplicity of Malaysian speech."

In this connection we notice with pleasure that the author has driven another nail into the coffin of the "Malayo-Polynesian" theory, which so long has retarded a true conception of Polynesian origins. He says: "There are very few items which are not included in the data here assembled. See what a small basis it forms for the erection of a Malayo-Polynesian family! In the Malay itself, the speech of which we have the longest record and the fullest comprehension, there are but 75 vocables safely identified as common, in these data, to the two families. Making the most generous allowance, a lavish allowance, for the vocables which evaded compilation under the conditions of this research, we can only thus doubtfully find a community of 150 words."

Surely it is time this theory were decently buried and never again allowed to be dragged like a red herring across the scent, to the confusion and multiplication of the errors it has involved in many writers. To such an extent indeed has it prevailed that we find authors who are thoroughly acquainted with the Polynesians actually referring to them as Malays, whereas we think there is no warrant either from the ethnic or linguistic point of view for such an idea. That there is some linguistic connection between Malay and Polynesian, our author (and others) has shown, but not to an extent authorizing the belief in a common origin of the two peoples, of which one is Mongoloid, the other Caucasian. The author points out what is probably the true source of this connection, and which has been hinted at in "Hawaiki," and by Fornander; namely, that it was the irruption of the Malay people into Indonesia that gave the

impetus to those extensive migrations of the Polynesians that have led them in the course of time to all parts of the Pacific. This expulsion was a process of many years, perhaps centuries, and during the continuance of it, contact between the two peoples could not have been otherwise than frequent, often by the capture of Polynesian women who would thus leave to their offspring by Malay fathers many words of their mother tongue, and hence we find them garnishing the Malay speech of to-day.

In Chapter IX. the author summarizes his conclusions in perspicuous form and draws attention to the mutual support of tradition and the philological argument, emphasizing that the former are quite clear on the early migration of the Proto-Samoans as distinguished from that of the Tongafiti, or later migrations, which he holds did not follow the same course as the earliest ones. Now the Tongafiti no doubt migrated by more than one route and at various times, and here we are able to support the author's theory by a summary statement deduced from traditions that have never been published, and with which of course the author could not possibly have been acquainted. These particular records were dictated by one of the last of the priests of the *Whare-wānanga*, or House of Learning, between the years 1840 and 1858, and are now in the possession of the Polynesian Society. One of these traditions traces a migration from the original home in Hawaiki (also called Irihia) whence they were expelled by a numerous people from "The land of Uru." Taking to the sea, they next occupied a country to which they gave the name of Tawhiti-nui. Again they were expelled by a black or dark people, and then with seven large sea-going canoes fully provisioned, steered before the south-west monsoon* in a northeasterly direction until they discovered a group of islands to which they gave the names of Hawaiki, Maui-nui, Maui-iti, Maui-taha and Ahu. From this group, after some generations, they came due south to other islands, which were named again Hawaiki and Tawhiti, and from thence, again after many generations they came away, steering "to the right hand of the setting sun, the moon, and Venus," in the month of February to New Zealand. Now in this tradition we see the course followed by the ancestors of those Maori tribes who dwell on the east coast of New Zealand, and it is clear that Tawhiti-nui is some land in Indonesia—perhaps either Sumatra or Borneo (probably the latter)—and that the second Hawaiki, the three Maui's and Ahu, are Hawaii, Maui and the two islands to the north and west respectively of the latter,

* Of course, the S.W. Monsoon would only help the voyagers part of the way.

Molokai and Lanai, and O-ahu of the Hawaiian Islands. The third Hawaiki is Tahiti, of which, and of the islands around it, the ancient name was Hawaiki.

This very brief statement of one of these extensive voyages confirms the author's theory that some of the Tongafiti came by a different route to that of the Proto-Samoan, while at the same time it does not account for the larger swarms of the former people who once occupied Viti, Samoa, etc., whose route cannot be exactly traced because the names of places mentioned by their traditions are now overlaid by more modern ones.

The author does not profess to indicate the original home of the Polynesian people; he traces them no further to the west than Java. But we may here ask why he has neglected that further outpost of this people in the Mentawai islands off the west coast of Sumatra. What we know of the inhabitants of this group, their customs, their entire difference from those of the neighboring lands, and a few words of the language—besides pictures of them—tends to the belief that we have here a belated colony of the Polynesians, left behind as the migrations passed to the east from further west, from, let us say, India on their way to Indonesia.

In an addendum to the book the author deals with some later material which he treats in the same rigorous manner as the former parts. These data refer to the vocabularies of Nuguria, a little island off the Solomons, and to Rapa-nui or Easter Island. With regard to the latter we learn that the dialect contains much more of the Proto-Samoan than the islands to the east—*i. e.* Tahiti, Paumotu, etc., and the author accounts for this by the suggestion that it was peopled by a combination of the two elements—Proto-Samoan and Tongafiti. But he sees a difficulty in regard to the traditional date of settlement, which he quotes as fifty-six generations ago, or about the year A. D. 500, or before the Tongafiti people had arrived in those parts. Now, if we mistake not, this "fifty-six generations" is taken from Paymaster W. J. Thomson's "Te Pito te Henua, or Easter Island." Considering the circumstances under which this and other information—notably the translation of the tablets, etc.—was communicated, considerable doubt must be felt as to the reliability of the names therein given; the more so as Dr. Lesson, the author of "*Les Polynésien*," gives two lines of twenty-three and twenty-seven generations since the ancestors of the present people occupied the island. Dr. Lesson from his long sojourn in Polynesia ought to be a fair authority. If he is right, Mr. Churchill's difficulty would disappear.

Altogether "Polynesian Wanderings" marks a great advance in the method of treatment of the interesting questions with which it deals, and the thanks of all Polynesian scholars are due to the author for the new light he throws on many obscure points, and for the laborious work he has brought to so successful a termination.

REGIONAL PECULIARITIES IN PLACE NAMES

BY

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When taken together, the place names of a region often give an insight into its history or religion, or into the economic and social status of the early inhabitants. The various types of place names may be broadly grouped in two classes:

(1) Names which have been deliberately and thoughtfully conferred.

(2) Names which have merely attached themselves to places, and are whimsical, freakish, or accidental.

It is probable that behind every place name there lies some reason, even in the case of the most freakish. Place names which have been conferred with deliberation are usually

(1) Descriptive, *c. g.*, names ending in *ford*, *falls*, *springs*, *vale*, etc.

(2) Commemorative,

of a person, *c. g.*, Delaware, Hudson, New York, Baltimore, or of an event. Immediately after such events as the sieges of Lucknow or Sebastopol, or the victories of Sedan, Manila, or Santiago, these names leap upon the map in various parts of the world, or

of an older place. Thousands of places in the West are named from places in the east and they in turn from places in England.

The place names bestowed upon a region at any particular period are generally full of historical significance.

(1) They usually tell the nationality of their authors. There are layers or patches of Celtic, Roman, Danish, Saxon, or Norman

names in England. In the United States, the Dutch left a trail of names in eastern New York, the French in Louisiana, the Spanish in Florida and California.

(2) They not infrequently tell the religion of their authors. Wherever the explorers and settlers were Catholics, place names abound in Saints, Sans, Santos; and such names as Los Angeles, Conception, and Trinidad, are frequent. The Puritan and Quaker communities and other religious settlements frequently have Bible names. There are about twenty places named Bethany and thirty named Bethel in the United States.

(3) Place names reflect the stage of culture of the people who bestow them. Primitive peoples use descriptive words. Indian names nearly always consist of a descriptive phrase, as Connecticut, *the long river*; Missouri, *muddy water*; Minnesota, *cloudy water*. Names given by hunters, miners, and mountaineers reflect the unschooled character of the people and their limited fund of names upon which to draw. On the other hand, people familiar with history and literature are likely to draw upon these sources for place names.

(4) The rise of a popular hero is recorded in a liberal sprinkling of places named for him and coming upon the map in the climax of his fame. Thirteen Deweys were added to the postoffices of the United States in 1898 following the battle of Manila; fifteen Schleys, after the battle of Santiago, and sixteen Roosevelts after the campaign in Cuba.

Other well-defined principles which obtain in the bestowal of place names might be cited, but the foregoing are sufficient for illustration. For the purposes of this paper, five regions have been selected. In each there is a rather striking group of names, which are not prominent elsewhere and which, with one exception, have a distinct historical relationship. These regions are situated in (1) New England; (2) New York; (3) New Jersey; (4) Virginia; (5) Kentucky and Tennessee.

NEW ENGLAND NAMES

No one can study the names which New Englanders bestowed upon their villages and towns without being impressed by two facts:

1. The very strong influence of Old England upon New England.
2. The evidence of both culture and character in the names.

New England town names are neither original nor picturesque, but they possess quality. They abound in the names which adorn the best history and the imperishable literature of Old England. The

people who made New England knew something of the history, the traditions and the literature of the mother country, and when they wove the mesh of place names which they spread over their new country, they unconsciously wove into the fabric the honored names which to them were familiar.

Not all New England geographical names have this character. The rivers and lakes abound in Indian words and the local names applied to prominent hills or peaks are mediocre. The real character of the early New Englander shows out only in the names of places.

In the following list taken from the Farmington Quadrangle (Connecticut), including the region about Hartford, the two characteristics of New England town names are seen, namely, their English ancestry and their substantial quality:

Granby	Bristol	Windsor	Glastonbury
Suffield	Hartford	Manchester	Southington
Enfield	Simsbury	Middleton	Hartland.
Barkhamstead	Farmington	Cheshire	

The truly characteristic place name in England is constructed on the same plan as a person's name. The ending is a family or group name, as -field, -ford, -ham, -bury, -ton, or -chester, while the first part of the word, like the given name of a person, is the specific or distinguishing name. There are large families of -fields, -fords, -burys, -hams, etc., just as there are Browns, Smiths, and Thomases. This same tendency to construct a place name of two parts by adding a conventional suffix such as -ford, -town, -ville, -burg, or -ton to a distinguishing prefix as in Fitch-burg, Brock-ton, or Springfield, is the common practice in the New England and Eastern States, but constantly diminishes toward the West. This is one of the ways in which place names show the decline of English influence as we go westward and the rise in the middle West of distinctively American notions and traits.

To illustrate: the ending, -ford, is a favorite one in England. In Connecticut, one place in every twenty-three ends in -ford and seventy-four per cent. of the place names are of the compound type, ending in -ville, -bury, -town, -field, etc. In Nebraska, on the other hand, only one place in 200 ends in -ford and only twenty per cent. of the names are of the compound type referred to.

While the names which the New Englander gave to his towns and villages are a credit to him, the names which have attached themselves to the conspicuous hills and peaks are of an entirely different character. Here are some selected from the section before

alluded to, the region about Hartford, Conn.: Bushy Hills, Barndoor Hills, Rattlesnake Hill, Burnt Hill, Whortleberry Hill, Bear Hill, Cherry Hill, Ragged Mountain, and Cathole Mountain. Yet the New Englander has done exactly what people seem to have done the country over when naming local hills and peaks. They allowed a crude, semi-descriptive term to attach itself and become the fixed name. And the practice seems to be founded in human psychology, for it is widespread.

INFLUENCE OF THE TOWNSHIP SYSTEM

Aside from the English influence evident in New England place names, and the general strength and quality of those names, there is another interesting trait. It is the influence of the township system. The New England township was no mere surveyor's unit, as it has been in parts of the West. It was a genuine territorial and governmental area. Nowhere else did the town-meeting have such a significant development and nowhere else has the township unit of self-government been so important in the community life. This importance of the township comes out strikingly in place names. Lebanon township in Maine, for example, contains the following villages: East Lebanon, North Lebanon, Center Lebanon, West Lebanon, and South Lebanon. Cornwall township in Connecticut contains Cornwall Hollow, West Cornwall, Cornwall Center, East Cornwall, and Cornwall Bridge.

This is quite the common thing in the older parts of New England. Maine's 1,200 postoffices include nearly 400 in which East, West, North and South are prefixed to a base name which is usually the name of the township in which they are found. About twenty-five per cent. of the town names of Massachusetts are of the same character. While New England names possess character, frivolous or freakish town names being exceedingly rare, yet they seem to betoken a people notably lacking in imagination. Five Lebanons in one township, and five Cornwalls in another, hardly suggests inventiveness. Here is another illustration: In southern Maine is a hill locally known as Blue Hill. The township is named Blue Hill. In the neighborhood are Blue Hill (village), Blue Hill Mineral Spring, North Blue Hill, South Blue Hill, East Blue Hill, Blue Hill Falls, Blue Hill Harbor, and Blue Hill Neck. All of these appear upon the map. Whether there are still other Blue Hills, not deemed worthy of a place upon the map, I can not say. Another locality is not content with a village of Yarmouth, and one of North Yarmouth, but adds an East North Yarmouth.

As you move westward along the path followed by emigrant settlers from New England, the township unit of local government continues, but its importance diminishes and its decline is marked by a decline in the frequency of the type of names which grew out of the township system. In New York, about eleven per cent. of the town names have the prefix East, West, South, or North; in Ohio, four per cent.; in Michigan, about three per cent.; in Wisconsin, two per cent.; while in the States further west, such names scarcely appear at all. However, the dull monotony of East, West, North, South and Middle is preferable to the insipid and characterless place names that appear in profusion in parts of some of our newer States, such for example as Abo, Alice, Amy, Anabel, Annie, Arnica, Attie, Aud and Ava, or Daisy, Damsel, Date, Dit, Dora, Dottie, Drum, and Duck.

CLASSICAL NAMES OF CENTRAL NEW YORK

The State of New York has a sprinkling of names, largely in the middle counties, that attract attention. In this case, no historical significance attaches to the group. They are merely names wantonly imposed upon the map, it is said, by a hollow-eyed classicist in the land office at Albany in the early days. Here are some of them:

Aristotle	Euclid	Ovid	Scipio
Attica	Fabius	Palmyra	Sempronius
Aurelius	Hannibal	Penelope	Solon
Carthage	Hector	Plato	Syracuse
Cato	Ithaca	Plutarch	Troy
Cicero	Junius	Rome	Utica
Cincinnatus	Macedon	Romulus	Virgil.

NEW JERSEY'S COOL AND BALMY NAMES

New Jersey has won some small notoriety as a home for trusts. A study of New Jersey place names should convince even the skeptic that the State is just as anxious to offer attractive homes to commuters, summer boarders and residents generally, as it is to offer a home for corporations. This enterprising little State lies near the two great cities, New York and Philadelphia. Many of the denizens of these cities, particularly of the former, live within brick walls; their outlook is upon brick walls; they work within brick walls and go to their work between brick walls. Sometimes they see the green hills of Jersey across the Hudson, and imagination pictures a cosy little home, with green grass, a tree and a breath of cool air in summer. Here is a suggestion for the real estate promoter, or perchance for the summer hotel and boarding-house keeper. The promoter is

a psychologist. He knows that a place named East North Yarmouth or Barndoor Hill will never attract the city dweller from his brick walls. But there are names which will. They are the names which suggest trees, dells, and coolness in summer. Every euphonious town name in Jersey was not born in the mind of a real estate promoter or seeker after summer boarders, yet the prominence of a certain class of names in this state is suggestive. Here are a few of them:

Allendale	Hillsdale	Cliffwood	Highwood
Annandale	Huffdale	Englewood	Richwood
Avondale	Oak Dale	Glenwood	Ridgewood
Bloomington	Pleasantdale	Lakewood	Ringwood
Brookdale	Riverdale	Ledgewood	Norwood
Ellisdale	Rosedale	Maplewood	Westwood.
Farmingdale		Wildwood	

Then there are -groves, -hursts, -vales, -parks, -heights, etc., in considerable numbers. There are Pleasant Grove, Pleasantdale, Pleasant Mills, Pleasant Run, Pleasantville and Point Pleasant.

Such names spring up in profusion only in regions where city influence is strong. The ordinary settler, or countryman, does not think of such names. He is much more likely to accept Johnsonsburg, Smith's Corners or East Gainesville. The -woods, -groves, and -dales appeal to urbanites, and the frequency of such names in New Jersey is one of the responses to the urban influences in the state.

PENNSYLVANIA'S -BURGS

The large German element among the settlers of Pennsylvania is reflected in 150 -burgs or -bergs, usually attached to the name of some man, as Harrisburg, Hublersburg, or Steinsburg. This type of name becomes much less common toward the West. There are only about a dozen -burgs in Nebraska, for example. In the newer States, a place is likely to be called Warren, or Harris, rather than Warrensburg or Harrisville. The older States have naturally been more influenced by the European practice, particularly the English, while the West, in place names as in other things, is more typically American.

INFLUENCE OF THE PLANTATION SYSTEM IN VIRGINIA

It has been pointed out that the development of the township with its villages, in New England, is reflected in the great number of place names containing East-, West-, North-, and South-. New England has long been an industrial section. This leads to the collecting of

people into villages and cities. Virginia, on the other hand, has ever been an agricultural State. Farming produces a scattered population and does not promote the growth of towns. Virginia has no townships and few places with East-, West-, etc., prefixed. A farming population must, however, have post-offices. The post-office is likely to be placed at a convenient point, to which people of the surrounding farms are naturally drawn. Such a place might be a shipping point on the river, and a considerable number of post-office names contains the word "wharf," as Hicks Wharf, or Evans Wharf.

About forty post-offices in Virginia end in "Store," as Brown's Store. Fifty end in "Spring," or "Springs," as Cedar Springs, Hot Springs. About 100 places contain the word "Mill" or "Mills" as Gaines Mill or Etna Mills. This same trait comes out also in many such names as Fairfax Station, Fords Depot, Gaines Cross Roads, Goodwin's Ferry, Goshen Bridge, and Graham's Forge. Nowhere else in the United States is this tendency to name places -Store, -Mill, -Wharf, -Depot, etc., so common as in Virginia. With the exception of the "Springs," these names are undoubtedly an outgrowth of the distinctively rural development of the State, necessitating central points to which the people might go to mill, to purchase supplies, to ship produce, etc., and hence giving rise to place names such as those mentioned.

PLACE NAMES IN THE MOUNTAINS OF KENTUCKY AND TENNESSEE

No one can study the place names of the United States without noting how well they reflect the general character of the early settlers. The degree of education of the settlers as a group comes out in the names which they adopt. People of limited education have restricted vocabularies and limited knowledge upon which to draw for names of places. Knowing little of history, geography and literature, they draw upon such resources as they have, and the leanness of their knowledge records itself in the general leanness of the place names which they impose.

As is well known, the poor lands, especially in the mountainous parts of Kentucky and Tennessee are and have been occupied by a backward type of men, the southern mountaineers. The educational poverty of the people is seen in the general character of the place names. Nowhere else does this particular type of names appear in such numbers. I refer to the hundreds of personal names, ordinarily used only as the Christian names of people, but in these States used for place names. The government postoffice map of a single county

(Lawrence County) in eastern Kentucky contains, among others, the following eighteen names:

Adeline	Jean	Madge	Ulysses
Clifford	Louisa	Mazie	Vessie
Charley	Lunda	Osie	Wilbur
Ellen	Marvin	Patrick	Zelda.
Goldie	Mattie		

The following appear among the A's in the list of postoffices in Kentucky (1895):

Abigail	Alex	Ammie	Antemus
Abner	Alger	Anglin	Arthur
Absher	Alonzo	Anna	Augusta
Adair	Amos	Annita	Avena.
Adolphus		Ansel	

Tennessee furnishes scores of such names as these:

A. B. C.	Andy	Charity
Ai	Bessie	Choice
Ark	Bob	Comfort
Aunt	Burt	Compensation
Bee	Callie	Concord
Bud	Daisy	Economy
Did	Effie	Grief
Fly	Eli	Harmony
Fry	Ina	Help
Ged	Jessie	Law
Gum	Kate	Life
Hix	Kittie	Necessity
Ho	Lida	Profit
Ipe	Lois	Reliance
Ken	Lucy	Rest
Key	Mabel	Right
Let	Mae	Solitude
Loo	Maggie	Surprise
Tut	Nancy	Unity
U Bet	Nellie	Vigor
Y. Z.	Tom	Virtue.

Yet, upon examining where such names are common, an interesting principle appears. Professor Shaler has shown the influence of geology upon political conditions in Kentucky during the Civil War. He points out that in the fertile lands of the limestone area of Kentucky—the Blue Grass Region—the people sympathized with the South; while the mountain people were loyal to the Union. The Blue Grass farmers were well-to-do and generally able to hold slaves. The farmers on the poorer lands could not afford slaves, and naturally leaned toward the North in the war. The same influence is very clearly seen in the place names of the State. In the

Blue Grass counties, the people possessed more wealth and more culture. Their broader knowledge led to the selection of more appropriate and dignified place names than were adopted by the poorer and less-educated people who occupied the mountainous parts of the State. There are some thirty counties in the limestone, or Blue Grass, area of Kentucky, yet in these thirty counties there are only about fifteen places that have received personal or Christian names such as Mary, Jennie, Ned, etc., while the twenty mountain countries lying immediately to the east have some eighty-five places so named. Magoffin County, for example, has Cyrus, Edna, Hortense, Matthew, Netty, Nehemiah, Ody, Trixie, Pearlie, and Waldo. Morgan County has Nanny, Bonny, Henry, Alice, Mima, Jephtha.

The influence of geology upon the topography, soil, and agriculture of a region is well recognized. These in turn have their influence upon economic and social conditions and the place names of the region will reflect the social and economic conditions of the people who bestowed the names.

CONCLUSION

In conclusion, it is evident that the grouping of a peculiar type of place names in a region is a record unconsciously written by the people who occupied the region and bestowed the names. Not only do the names reveal the nationality of early settlers, as seen in the Dutch names of the Hudson Valley, or the religious affiliations as seen in the frequency of places named for the saints wherever Catholic explorers and missionaries went, but they reflect political and industrial conditions as seen in the very high per cent. of place names including East-, West-, North-, South-, etc., in New England, where the township idea prevailed, and village and town life so largely supplanted rural life. The hundreds of little places named Store, Wharf, Mill, Depot, etc. in Virginia reflect the development of that State as an agricultural region. The -dales, -woods, -groves, -hursts, -heights, etc., so frequent in New Jersey, reflect the suburban development in that State. And the notable adoption of personal Christian names and other inappropriate names for places in the mountainous parts of Kentucky and Tennessee, with the infrequency of such names in the better parts of these States, reflect the difference in the economic and educational conditions of the early inhabitants of the region.

Thus do the peculiarities of the people of different regions record themselves, not only in customs, laws, and institutions, but also in the names of places.

PALMER LAND

BY

EDWIN SWIFT BALCH

It is most gratifying to American geographers to see the adoption, at last, of the names Palmer Land and Wilkes Land by the Royal Geographical Society of London. In the *Geographical Journal* for March, 1910, p. 338, the name Wilkes Land was used, apparently rather as a matter of course, and without any suggestion that it was an addition to the nomenclature employed up to that time by official British geographers.

In the *Geographical Journal* for March 1911, however, a much greater step forward was taken. For on the maps illustrating the paper by Dr. Jean B. Charcot, we not only find on the little central one of the South Polar Regions the name Wilkes Land, but on three of the others we find the name Palmer Land. And not only is the name Palmer Land charted on these maps, but the name Palmer Land is in its correct place, on the north shore of the northern mainland of West Antarctica.

It is only justice that this should be so. For the mainland of West Antarctica, as far as the records show, was first sighted by Nathaniel B. Palmer* of Stonington, Conn., and the land was named after him, possibly by the Russian admiral and antarctic circumnavigator Bellingshausen.

Fanning, in his somewhat confused account of the discovery of the mainland of West Antarctica, says that Captain Pendleton reported that from an elevated station on Deception Island, he had discovered mountains in the south. Fanning then goes on to state how the name Palmer Land came deservedly to be given to it. It would seem from the first statement as if the name should be Pendleton Land and not Palmer Land, a point to which Dr. Norden-skjöld called attention. But if this were correct, why was the name Palmer Land adopted by the sealers and why should Fanning say it was deservedly given?

The answer to this is that it was almost surely Nathaniel B. Palmer, and not Pendleton, who first sighted, from Deception Island, land to the south. Mrs. Richard Fanning Loper, of Stonington, Connecticut, the niece of Nathaniel B. Palmer, has both stated and written to the writer that her uncle was an unusually keen sighted

*A short biographical sketch of Nathaniel B. Palmer will be found in the article by the writer: "Stonington Antarctic Explorers." *Bulletin Amer. Geog. Soc.*, Vol. XLI., Aug., 1909. ▽



NATHANIEL B. PALMER.

man, and that she has often heard him tell how he had first sighted land to the south of anything then known, of the excitement he was thrown into, and of the desire it aroused in him to go to explore it.

Confirmation of this fact may be had by looking at the portrait of Nathaniel B. Palmer, which is published with this article. The illustration is made from a photograph of Captain Palmer taken about the year 1868 and presented to the writer by Mrs. Loper. In looking at this picture it is impossible not to notice the eyes. If ever a man had an eagle eye, an eye which could see far and see accurately, that man was Captain Palmer. And this goes far to prove that Palmer was entirely truthful in stating that he was the first to see Palmer Land, and to corroborate Fanning's assertion that the name Palmer Land was deservedly given to the northern mainland of West Antarctica.

GEOGRAPHICAL RECORD

THE AMERICAN GEOGRAPHICAL SOCIETY

THE MARCH MEETING OF THE SOCIETY. A regular meeting of the Society was held at the Engineering Societies' Building, No. 29 West Thirty-ninth St., on Tuesday evening, March 21, 1911. Vice-President Greenough in the Chair.

The following persons recommended by the Council were elected to Fellowship:

William F. Bass,	Howard Townsend Martin,
Mrs. William Bucknell,	Frederick Townsend Martin,
Benjamin Chew.	Schuyler Schieffelin,
S. R. Klein, M.D.,	Frank D. Waterman,

Dr. M. B. Williams.

The Chairman then introduced Prof. Arthur Stanley Riggs who addressed the Society on "Sicily and Southern Italy." A large number of stereopticon views were shown. The Society then adjourned.

THE PRESENTATION OF THE CULLUM GEOGRAPHICAL MEDAL TO PROF. DR. HERMANN WAGNER. The presentation of the Cullum Geographical Medal awarded by the American Geographical Society to Prof. Dr. Hermann Wagner, took place in the salon of the American Embassy, Berlin, March 5, 1911, at 5 P. M. Those present were: Prof. Dr. Hermann Wagner; His Excellency, Geheimrat Prof. Dr. A. Wagner; Geheimrat Prof. Dr. Penck; Geheimrat Dr. Hellmann; Prof. Dr. von Luschan; Ministerialdirektor Dr. Th. Lewald; Imperial German Consul H. Freytag.

Invitations had also been sent to the Prussian Cultus-Minister and to Prof. Dr. Karl von den Steinen, who sent letters of regret at their inability to attend.

The Hon. David J. Hill, Ambassador of the United States to Germany, said that he had received from the Secretary of the American Geographical Society a letter requesting him to arrange for the presentation of the medal to Prof. Wagner, whose work in Geography has been of very high rank and is highly appreciated in the United States. The American Geographical Society had

voted him the Cullum Geographical Medal in recognition of his distinguished services to geographical science.

In presenting the medal Ambassador Hill spoke of the pleasure it gave him to be the medium of transmitting it on behalf of the American Geographical Society, and he was glad that it could be done in the presence of such distinguished gentlemen as those who had done him the honor to come to the Embassy to assist at the presentation.

The Ambassador said further, that in the United States there existed no rank of nobility, and even if Wagner should live all his life in America, his (the Ambassador's) country could never confer the honor of nobility upon him. And yet there were noblemen in America for wherever men pursue knowledge with devotion and for human good, there were noblemen; and therefore America could confer no higher honor upon Prof. Wagner than it did now, in this recognition of his valuable services to science.

In accepting the gift, Prof. Wagner thanked the Ambassador for the trouble he personally had taken in arranging the presentation and expressed appreciation of the form it had taken, being in a sense solemn and yet at the same time unceremonious. He said he was very pleasantly surprised at being awarded the medal. Though he had never had any direct dealings with the American Geographical Society, he had for many years been in relation with Americans both officials and private persons, in connection with his work. And, with regard to all, he would like on this occasion to express his great appreciation of the courtesy that had always been shown him and his colleagues, especially as regards the promptitude and thoroughness with which all inquiries addressed to the Americans were answered by them and the liberality they evinced in supply of publications.

The Professor named a number of American Institutions to whom he felt indebted in this respect. Dr. Day, of the Geological Survey, had said to him for example: "Dr. Wagner, if ever you want anything of the Geological Survey, just send us two words and you shall have it."

Prof. Wagner was especially gratified that just his class of work had been recognized in this flattering way, for it was a class of work in Geography which he believed had not hitherto found recognition in the United States.

The Professor closed his remarks by once more thanking the Ambassador and saying that he felt that such private acts of international courtesy must serve to bring the nations into closer accord.

He then exhibited the medal to the gentlemen who had assisted at the presentation, and the company retired to the dining-room of the Embassy, where a collation was served.

NORTH AMERICA

PRODUCTION OF IRON ORE, PIG IRON AND STEEL IN THE U. S. IN 1909. Statistics of the production of iron ore, pig iron, and steel in the United States in 1909, collected by the U. S. Geological Survey and the Bureau of the Census, have just been published by the Survey as an advance chapter, by Ernest F. Burchard, from "Mineral Resources of the United States, Calendar Year 1909." The total quantity of iron ore produced in 1909 was 51,294,271 long tons, valued at \$110,290,596 at the mines, as compared with 35,983,336 tons, valued at \$81,845,904 in 1908. With the exception of 1907, when the production was 51,720,619 tons, 1909 was the banner year in iron ore production.

Of the iron-producing States Minnesota led as usual, in 1909, with 28,975,-

149 tons, which was more than the total production in the United States in 1900. Michigan came second, producing 11,900,384 tons; Alabama was third, producing 4,321,252 tons; Wisconsin fourth, with 1,067,436 tons; and New York fifth, with 1,015,333 tons. No other State produced as much as a million tons. The production of Cuban iron ore in 1909 was 930,446 long tons, as compared with 819,434 tons in 1908.

The total production of pig iron, including spiegeleisen and ferromanganese, in 1909 was 25,795,471 long tons; and of steel 23,955,021 tons.

GLACIAL ADVANCE IN ALASKA AND EARTHQUAKES. The advance and retreat of glaciers are usually attributed to slight changes in precipitation, or in temperature, or both. It is, therefore, a novel idea to see in earthquake shocks, producing an excess of snow-supply, the cause of glacial advance. In his study of the Yakutat Bay Region, Alaska (U. S. Geol. Survey, Prof. Paper 64, 1909) Prof. Ralph S. Tarr comes to this interesting conclusion. Several of the valley glaciers of the Yakutat Bay Region showed a remarkable advance, "in the nature of a paroxysmal thrust," within ten months preceding June, 1906. Climatic causes fail to give any adequate explanation. The most satisfactory hypothesis is found in a great increase of the snow-supply, due to earthquake shaking in 1899. Great avalanches of snow were, it is believed, then thrown down to the *névé*, "starting a vigorous wave of advance whose effects have now reached the glaciers." Persons camping near one of the glaciers at the time of the earthquakes reported that they noted the violent shakings and that there were noises like thunder as great avalanches of snow and rock descended the mountain slopes. If this be the true explanation, and the evidence presented seems strongly to favor this hypothesis, then climate was only indirectly responsible for the glacial advances here discussed. R. DEC. WARD.

HISTORY OF THE GRAND CANYON DISTRICT. In Dutton's classical work on the Colorado Canyon district it was inferred that the Colorado River and its tributaries were established before the faults and folds of the plateau region came into existence. At a much later period the displacements came so gradually that the main drainage lines were able to maintain their courses, cutting their channels as fast as uplift occurred across their paths. In other words, the Colorado and its main tributaries were antecedent rivers. Powell had reached the same conclusion in his still earlier work. A few years ago Davis advanced an alternative theory, that the displacements were much older than had previously been supposed and that after they occurred, the region was reduced to a peneplain, over which the Colorado River system extended, the present Canyon being due to the entrenching of the river.

Prof. D. W. Johnson, with a small party, made an expedition in 1906 for the purpose of testing these two rival hypotheses, and in an article (*Proceedings Boston Society of Natural History*, Vol. 34, 1909, pp. 135-161) he gives a detailed statement of his observations and conclusions. There is much painstaking detail in the paper, but the main conclusions of his summer's work are stated in a brief summary in the following words:

"South of the Cañon, in the San Francisco Plateau, displacements are more numerous than has been supposed, although of little importance compared with the great displacements north of the Cañon. The 'crag's' of the Echo Cliff probably owe their peculiar form to erosion guided by strongly marked cross-bedding, and possibly in part also to the influence of a well developed system of joints. The Sevier and Toroweap Faults are independent and do not join

each other to form one great displacement, as has been thought might be the case. The Hurricane Cliffs in the vicinity of the Virgin River are true fault cliffs wholly due to recent faulting at two different periods. In all, three periods of faulting along the same plane have occurred in that region, the first and second periods being separated from each other by a long era of base-levelling, while the second and third periods were separated by a shorter, but none the less distinct, erosion interval. Observations made along other displacements in the Grand Cañon district confirm the theory that the faults of this district are in the main of ancient date." R. S. TARR.

IMMIGRATION INTO CANADA. The Department of the Interior, Canada, has just printed the "Report on Immigration," (*Annual Report*, 1910, Part II). Of the steerage passengers arriving in the fiscal year 1909-10, 137,442 were for Canada and 36,946 for the United States, bringing the total immigration to 208,794, an increase over the preceding fiscal year of 61,886.

The area of new land placed under wheat in the Spring of 1909 was 20 per cent. in excess of the previous year, with every indication that 1910 would see a similarly increased percentage of wheat acreage, particularly in Saskatchewan and Alberta. The wheat crop in the three prairie provinces in 1909 was 147,000,000 bushels. On March 31, 1909, there were open and available in Manitoba, Saskatchewan and Alberta, 195,731 homesteads. The new areas surveyed increased the number of homesteads available on March 31, 1910, to 204,545, equal to 32,713,200 acres, one-tenth greater in area than the state of Ohio. There is a vast region in the great northland yet to be surveyed and opened for homestead entry.

Much improvement was noticed in the physique and general character of the immigrants to Canada in 1909 and 1910. The volume of immigration from the United States has increased to an amazing extent and these American settlers bring with them a good physique, a long practical knowledge of western agriculture, a generous supply of stock and implements and in most cases a good sum of cash.

The opening of the Grand Trunk Pacific between Winnipeg and Wolf Creek in Northwestern Alberta, of the Goose Lake branch of the Canadian Northern, and similar extensions in Saskatchewan and Alberta of the Canadian Pacific, have greatly facilitated the settlement of the country. Commissioner J. Bruce Walker says that the day is not far distant when, in the prairie provinces, it will be impossible for any farmer to be more than a few hours distant from the nearest railway depot. It is still very difficult to obtain a sufficient number of harvest hands. One of the results of increased settlement is a serious shortage in the supply of horses and of stock generally. The price of farm horses has risen 40 per cent. in two years and of oxen 25 per cent.

THE FUR SEALS OF BERING SEA. The London *Times* of March 17 says that Russia has accepted the invitation from our Government to take part in a new seal fishing conference at Washington, a few months hence. It is understood that the invitation from our Government to the Government of the United Kingdom to take part in this conference will be accepted. The American agents declare that the seals are now only one-fourth as numerous as at the time of the Paris arbitration when the diminution had already gone far. Meanwhile the Canadian sealing fleet has dwindled almost to nothing and it is affirmed that the Japanese are mainly responsible for the further depletion of the seals. As Japan was not a party to the Paris arbitration, the sixty-mile

limit has never applied to the Japanese, and their sealers accordingly ply this trade around both the Russian and American islands right up to the three-mile limit and even some times to the very shore. It is believed that Japan has agreed to take part in the coming conference and there is every reason to hope that an arrangement may be made by which the destruction shall be arrested and the herds gradually restored.

SOUTH AMERICA

THE YALE EXPEDITION TO PERU. Prof. Hiram Bingham of Yale University writes to the *Bulletin*:

"We expect to leave New Haven on June 10 and will be gone until Dec. 18, spending five months in the field doing geographical, archæological and historical exploration. We expect to make a cross section of the Andes through a country that has never been scientifically explored and only mapped in the rudest possible way some fifty years ago. The party will probably consist of a physiographer and geologist, a skilled topographer, an assistant topographer, and possibly a surgeon and naturalist, besides the director.

"There are four problems before us. The first is: How far into the Amazon jungle did the Incas carry their civilization? I am convinced that there are more Inca ruins to be discovered near Choquequirau, and particularly on the north slopes of the glacier-clad peaks which separate Choquequirau from the Urubamba Valley. Dr. Forbes, who led the Harvard expedition into Peru three years ago, went down this valley, and confirms my opinion that the region which we propose to enter is one of the most important unexplored archæological fields in Peru. We shall probably spend about two months and a half in this region, doing everything we can to visit any ruins that are reported, particularly in the Vilcabam valley where the last Inca lived after he escaped from the Spaniards.

"The second is: A reconnaissance along the 73d meridian from the Amazon valley to the Ocean, a distance of perhaps 300 miles. This reconnaissance, taking about a month, will include physiography, geology, archæology, etc. The region is an interesting one historically and in it the great Gen. Sucre campaigned in the weeks preceding the battle of Ayacucho, which has been called "The Yorktown of South America." In it also lies the rich sugar region of Abancay, and the celebrated ruins of Choquequirau, which I visited on my last journey to Peru.

"Third: Mount Coropuna, a volcanic cone with a magnificent ice cap. Few people have ever heard of it, but some believe it to be the highest mountain in South America. Prof. Bandalier is inclined to the belief that it is over 23,000 feet high. If possible we shall climb the mountain. If not we shall content ourselves with determining its altitude instrumentally and making a good map of it. There are several villages near the mountain which offer an interesting field for the study of human geography.

"Fourth: About forty miles northwest of Mount Coropuna is Lake Parinacochas, which is practically unknown and unexplored. It is our plan to take along a folding canoe so as to be able to make a bathymetrical survey of the lake and a rough survey of its shores. We expect also to determine the latitude and longitude of various points.

"In conclusion, it is the object of the expedition to explore a portion of Peru which is not at present known to science. The amount and kind of information which we shall try to gather will be limited only by the number and the

individual ability of the men who compose the expedition, and by the time. I hope that we shall be able to secure the necessary funds to pay the expenses of both a physician and a naturalist, the latter to make collections of flora and fauna for the Peabody Museum."

AFRICA

NAVIGATION ON THE UPPER NIGER. The Upper Niger has about 500 miles of navigation on the three rivers, Niger, Milo, and Tinkisso. The Milo is navigable from Kankan for 130 miles to its confluence with the Niger. About 130 miles of navigation on the Tinkisso connects Dinguirra with Siguiri and the navigable reach of the Upper Niger itself extends from Kurussa to Bamako about 225 miles. The railroad from Bamako to Kulikoro circumvents the rapids in the river, above which there is 1,054 miles of navigation on the Middle Niger from Kulikoro to Ansongo for small boats the year around and for little steamers drawing not over three and one-half feet about six months; from July to January between Kulikoro and Mopti at the confluence of the Bani River; and from August to February between Mopti and Timbuktu; from December to the end of May between Timbuktu and Ansongo. The navigable reach of the Middle Niger is connected with the Senegal River by the railroad Kulikoro-Bamako-Kayes (372 miles). The direct line between the seaport of Dakar and Kayes at the head of navigation on the Senegal, is now being built, work having been begun in 1909 at the two extremities of the route. When this line is completed to Kayes, Dakar will be connected with the navigable Niger by 790 miles of railroad. (Auguste Chevalier, in *Bull. Soc. Languedocienne de Géog.*, Tome 33, Deuxième et Troisième Trimestres, 1910).

THE BENUE COMPLETELY EXPLORED. Capt. Strümpel, in charge of the German interests in Adamaua, Cameroons, has surveyed the last unknown stretch of the Benue River, the largest tributary of the Niger. Flegel discovered the headwaters of the Benue north of Ngaundere in 1882, and in 1893 Passarge extended the survey up the river from Garua to Bubandjika. Strümpel has surveyed the stream between its headwaters and Passarge's farthest. It has taken sixty years to reveal the entire course of this large river.

HANS MEYER RETURNING TO GERMAN EAST AFRICA. Prof. Dr. Hans Meyer of Leipzig, the first explorer to reach the top of Mt. Kilimanjaro, will return this spring to German East Africa to investigate the Virunga volcanic region, north of Lake Kivu. This is the only region among the great lakes of Central Africa where active volcanoes are found. He will also study the German-Belgian Congo boundary regions in the neighborhood of Lakes Tanganika and Nyasa. (*Pet. Mitt.*, 57 Jahrg., März Heft, 1911, p. 137.)

EXPLORING THE LIBYAN WASTE IN AN AIRSHIP. According to *Petermanns Mitteilungen*, (57 Jahrg., März Heft, 1911, p. 137), the Prussian geologist Dr. L. Siegert will soon attempt to cross in an airship the vast unknown region in the Libyan desert between the Egyptian oases in the East and the great caravan route from Tripoli to Lake Chad in the West. Rohlfs in 1874 and 1879 and Nachtigal in 1870-71 crossed parts of this waste, carefully studying the regions along these routes. Dr. Siegert believes that he may cross this region from the Mediterranean to the Nile in about thirty hours and that this journey will be favored by the prevailing winds. It is doubtful however, if he will be able, in an air flight, to add much to what is already known. The prospects of the discovery of unknown oases are small.

TOPOGRAPHIC SURVEYS IN BRITISH EAST AFRICA. The *Annual Report* of the Survey Department of British East Africa, for the year ending March 31, 1910, says that trigonometrical work was extended northwards during the year from Mombasa to the Sabaki and for some distance up that river. The work was very arduous owing to the bush and forest that had to be cleared to permit observing. A beginning was made with triangulation over the Laikipiak Plateau. With the *Report*, are two provisional maps in colors, showing the areas covered by triangulation and by the topographical survey. The work of mapping this large province is making good progress considering the small force of topographers.

DESTRUCTION OF TELEGRAPH LINES BY GIRAFFES. On account of the repeated destruction of the telegraph line in the neighborhood of Sadani, German East Africa, the Government has authorized the killing of these animals in that region. Heretofore it has been illegal to shoot giraffes except within the two-mile limit on either side of telegraph lines. (*Deutsch Ostafrik. Zeit.*, No. 13, 1911.)

ASIA

THE RUSSIAN SCIENTIFIC EXPEDITION TO THE AMUR. The Commission that was sent to the basin of the Amur River by the St. Petersburg Committee on Colonization of the Far East, has completed its labors. The leader of the expedition, Mr. N. L. Gondatti, now Governor General of the Amur Province, studied not only the adaptability of the Amur region for farming enterprises but also investigated the forests and mineral resources and the prospects of fisheries. The best means of connecting the Trans-Baikal and the Amur region with the Government of Jakutsk by good roads is discussed in the report. The southern part of the Jakutsk territory is reported to be well adapted for cattle raising. As the Amur will be very useful as an export and import route it is very important that the bar at its mouth be removed.

AUSTRALIA

THE BANANA IN TROPICAL AUSTRALIA. Melbourne received in January, a consignment of bananas from the Cardwell District in the northern or tropical part of Queensland, which marks an important phase of the development of industry in that state. *United Empire* (March, 1911) says the fruit was grown by white labor, by Mr. P. T. Hogg, who two years ago, began to raise bananas, on Hinchbrook Channel. His plantation comprises thirty acres. The most interesting fact relating to the shipment is that each bunch, instead of containing from twelve to fourteen dozen fruit, carried no less than twenty dozen, and each banana was larger than usual, measuring on an average, nine inches, plump and well formed. The fruit is of finer quality, than that received from the Chinese growers of Fiji. There are about 200 plants to the acre, and the gross returns per acre, amount to \$350.

EUROPE

GREENWICH TIME ADOPTED IN FRANCE. Greenwich time has been adopted throughout France and Algeria. At midnight on Friday, March 10, all public clocks throughout the country were set back by the nine minutes and twenty-one seconds which represent the difference between the longitudes of Greenwich and Paris. Thus Greenwich mean time is now adopted for all practical purposes as the basis of what is known as "standard time" throughout the greater part of the civilized world.

This is no doubt due in the main to the unifying influence of science which sooner or later compels the whole world to adopt common standards of measurements for those things which men find it to their advantage to measure uniformly. But the Observatory of Paris and the meridian of Paris are not things easily dislodged from their established pride of place. It cannot have been without a sentimental pang—altogether legitimate and even laudable in itself—that France has allowed them to yield precedence to the Observatory and the meridian of another nation.—(*London Times, weekly edition, March 17, 1911.*)

SAINT-DIÉ'S CELEBRATION. The little city of Saint-Dié, France, has sometimes been referred to by historians as "the Godmother of America" because there, among the picturesque mountains of Vosges, was printed in 1507, the famous little treatise in Latin entitled "*Cosmographiæ Introductio*" by Waldseemüller, in which the name "America" appeared for the first time, (*Bulletin*, Vol. 34, p. 54, 1902). The City will celebrate this interesting fact and also inaugurate its new Chamber of Commerce, by an exhibition devoted to archaeology, history, art and the industries of Vosges. The celebration will occur on June 3-5, when Ministers of the French Government and the Ambassador and Consul General of the United States and other officials will be present. The mayor of Saint Dié has invited delegations from various scientific societies of America to be present on this occasion.

POLAR

LATEST ANNOUNCEMENT OF FILCHNER'S PLANS. A note from Berlin on the latest development of the preparations for the Filchner Expedition says that his general object is to push as far south as possible, through Weddell Sea and towards the center of the Antarctic land mass or masses and especially to determine the relations between the eastern and western portions of the land and ascertain if water channels divide it into two or more masses. He expects to visit Coats Land, trace its coast as far south as possible and establish a base station on Coats Land or south of it, as a starting point for the sledge expedition and as the headquarters where scientific observations may be carried on for a year or more. The landing party will number eleven men, of whom seven will have charge of work at the station, while four will form the southern sledge party. If possible the ship will return north to continue its oceanographical work.

The scientific programme will include besides strictly geographical work, investigations in geology, oceanography, biology, meteorology, magnetism, etc. During the journey from Germany, special efforts will be made to add to our knowledge of the Atlantic sill, which is known to extend north and south for a great distance. Soundings will be made to establish the position of this subterranean rise, between 0° and 10° north. Lieut. Filchner has chosen as his scientific assistants, Dr. Barkow of the Royal Prussian Meteorological Institute as meteorologist; Dr. Seelheim, as geographer, Dr. Heim as geologist, Dr. Przybyllok for astronomical and terrestrial magnetic observations, and several others.

The ship which was purchased last Autumn in Norway, is a whaler built in 1905 of fir, oak and pitch pine, strengthened for ice navigation, and cased in greenheart. She is believed to be splendidly adapted for Polar work. Her

commander will be Captain R. Vahsel, who was on the Gauss Expedition, and has had experience in ice work. Among the features of the equipment is an installation for wireless telegraphy, specially constructed motor cars, and both dogs and Manchurian ponies for sledge transport.

The main geographical objects of Filchner's Expedition are thus seen to be to determine the distribution of land and water, establish the coast line of the Antarctic Continent and study the conformation of the ice.

JAPANESE ANTARCTIC EXPEDITION. A Japanese Antarctic expedition has been organized and is supported by public subscription. The leader of the expedition is Lieut. Shirase, an ex-military officer, and the party consists of twenty men, eight of whom are to accompany the leader on his sledge journey. The ship destined for the purpose is a sealer, and the name *Kainan-maru* (Exploring the South) was given to her by Admiral Togo before she left the Bay of Tokio on Nov. 29, 1910. She sailed first to New Zealand, reaching Wellington on Feb. 8, and leaving for the south on Feb. 11, after coaling and taking in provisions. The party will endeavor to find a suitable place along King Edward VII Land, whence they will start on a sledge journey to the Pole. The great, perhaps sole object of the expedition is to reach the Pole, and dogs are to be used in drawing the sledges. The funds available are very limited at present amounting to £10,000. Count Okuma, who is the head of the Association for financing the expedition, is earnestly endeavoring to add to this sum. (*Scott. Geogr. Mag.*, March, 1911, p. 151.)

RUSSIAN EXPEDITION TO NOVAYA ZEMLIA. A Russian expedition was successful last summer in circumnavigating the northern island of Novaya Zemlia in the *Queen Olga*, Capt. Sedov who, as stated in *Petermanns Mitteilungen* for December, had previously carried out surveys on the northern coast of Eastern Siberia. A statement has been made in the daily press, on the authority of Mr. Rusanof (apparently a member of the same expedition), that the open water found off the northern coast of the island proves that the Gulf Stream passes to the north of Novaya Zemlia. That such a statement can have little valid foundation (few if any scientific observations having been made during the rapid voyage round the island) seems sufficiently obvious and it appears that various Russian scientists, including General J. de Shokalsky, have pointed this out in the Russian papers. The experiences of various earlier voyagers would seem to show that the state of things described must be somewhat exceptional. The note in the *Mitteilungen* also mentions that the Governor of Archangel, Mr. J. W. Sosnovski, likewise visited Novaya Zemlia, for the purpose of forming a Russian settlement, and that several settlements of Norwegian sealers were found along the coast during the voyage of the *Queen Olga*. (*Geog. Journ.*, March, 1911, p. 322.)

EDUCATIONAL GEOGRAPHY

GEOGRAPHY IN GERMANY AND IN THE UNITED STATES. Mrs. Martha K. Genthe, an associate editor of the *Bulletin*, who has returned to her old home in Germany has a short paper under the above title in the *Journal of Geography* (April, 1911). Her wide knowledge of geography teaching in both Germany and the United States gives special value to the paper of which the following abridgment is here given:

She considers as special opportunities which Germany offers towards the best possible results in the teaching of geography (1), the existence at every

university of a special department of geography which is second to no other department and in some of the universities second to no university department in the world. Hence, there is a constant and regular supply of teachers of geography for all kinds of schools who are specialists in their line and who work incessantly for the betterment of geographical instruction; (2), the abundant supply of excellent maps and atlases for all kinds of schools. The influence of these conditions is that the map, not the text-book, is made the foundation of the lesson.

The study of geography is subordinate in those higher schools in which the classical languages are considered the only royal road to success. In the Ober-reale Schule and the Real Schule however, geography is taught not only as a useful subject but as one which makes for culture. In the elementary schools the conditions are most favorable because the amount of time allotted to geography is the same as that devoted to the other sciences and it extends through the whole course.

Mrs. Genthe regards America as handicapped geographically because there is lack of general recognition of geography as a scientific study. The number of universities in which it is adequately represented is still small, hence, the teaching profession is not so well supplied with geographical specialists who can give weight to the argument in favor of better courses in geography. Many schools are compelled to employ teachers without even any pedagogical training, at whose hands geography fares poorly. Most of the school maps are rather poor works of cartographic art to say nothing of those in which this art is completely absent, so that the text plays a larger part in the lesson and there is constant danger of geography becoming a mere book study.

The cost should not stand in the way of providing better maps and no child should leave school without being able to use the topographic map. None but trained geographers should be employed at the high schools to teach geography, and there should be a three years' course in it for every high school, because the cultural value of geography increases in proportion to the age and maturity of the student. The same even more emphatically must be said of the College. If there is any foundation for the belief that geography is taught better in Germany than in America, it can be explained only through the better quality of the average teacher in Germany.

PHYSICAL GEOGRAPHY

THE MAGNETIC SURVEY YACHT *CARNEGIE*. The *Carnegie* arrived at Cape Town on March 20. Since June last she has traveled about 1,400 miles in the Atlantic Ocean. Dr. Bauer left Vancouver on March 24 to make magnetic observations in the Samoan Islands during the total solar eclipse of April 28. He will meet the *Carnegie* at Colombo, Ceylon.

LARGE CITIES, WIND VELOCITY AND HYGIENE. That air temperatures in large cities differ somewhat from those recorded in the surrounding country has been known for some years, the details having been obtained through the careful investigations of Renou for Paris, of Hellmann and Perlewitz for Berlin, and of others. Within the cities the mean temperatures average from 1° to 2°, more or less, too high. Recently, another effect of the increasing obstruction offered by large cities to the movement of the air has been brought out in the case of Berlin. In that city, in 20 years, the wind velocity has decreased from about 12 miles (19.4 km.) an hour to about 8 miles (12.9 km.) an hour. This

notable reduction in velocity, which is discussed in *Das Wetter*, 1910, No. 10, shows that the ventilation of streets and of houses by the natural movement of the atmosphere is less effective than it used to be in Berlin. The same thing is likely to be true of other growing cities. That this may have consequences of importance from the point of view of public hygiene is clear. The question, "how far can man influence climate?" is an interesting one. Here, certainly, is a case where man is bringing about a noticeable change in an element of climate which is of great importance to the public health. R. DEC. WARD.

THE GEOLOGIC WORK OF ANTS. In the *Bull. of the Geol. Soc. of America* (Vol. 21, 1910, pp. 449-496), Prof. J. C. Branner discusses the importance of ants as geologic agents, particularly in tropical zones, basing his remarks partly on his own observations in Brazil, and partly upon the general literature of the subject. He shows that they are extraordinarily abundant, that they are exceedingly destructive of certain forms of vegetation, and that certain species even attack man. Some species are beneficial as scavengers, but others seem to play the rôle of destructive agents solely. Prof. Branner says: "Save in the cities, they are almost omnipresent. To the housekeeper they are not only never-sleeping pests, but they are bold and defiant robbers or sneak thieves, as circumstances require, and they cannot be ignored. To the planters they are veritable plagues—they destroy the growing crops as completely as if they had been burned over. They do not wipe out a field of grain in a few hours as completely as do the locust swarms of Argentina, and then disappear, but they stay with their work right alongside of the crops, and in time they destroy them no less certainly. Unlike locusts, they do not come and depart, but they stay right in one circumscribed area all their lives. . . Nor can their importance be regarded as whimsical in any sense; indeed, I am convinced that they are social and even national factors that are not to be ignored."

As purely geological agents ants perform work of several kinds. In the first place they penetrate the earth in various directions and to a considerable depth. Branner mentions one case in which he found ant burrows at a depth of 2.1 meters, and refers to a case of a burrow found at a depth of 3.5 meters. These tunnels ramify the ground over great areas, and Branner says, "I have myself seen fumes blown into one opening and issuing from others as much as 300 meters away." The material excavated in the course of the burrowing is brought to the air, and therefore exposed to weathering, and piled in mounds, some of which are 5 meters high, and 16 or 17 meters in diameter. The white ants, or termites, perform work of a kind similar to that of the true ants, though with notable differences which he points out. They do no direct harm to crops and animals as the true ants do, though they interfere with agriculture by the encumbrance of the ground with "big hard rock like nests." They also do damage by destroying "wood used in the construction of fences, houses, bridges, and furniture, and they sometimes burrow into books and papers."

The openings made in the soil by the ants aid the processes of weathering by permitting freer circulation of air and carbon dioxide, by bringing large quantities of soil and sub-soil to the surface, by opening up passageways for circulating water, and by taking organic matter under ground where it aids in rock disintegration. Prof. Branner makes a calculation on which, however, he does not attempt to place complete confidence, comparing the work done over a given surface by ants in Brazil and earthworms in England. According to this calculation the total amount of earth brought to the surface in 100 years

over an area of one hectare (10,000 square meters) is 2,598,500 kilograms in the case of earthworms in England, and 3,226,250 kilograms in the case of Brazilian ants. From his general study of the subject Branner concludes, "Although the data available are defective, we seem to be warranted in concluding that ants and termites are quite as important geological agents in tropical America as are the earthworms of temperate zones. They are also factors of great importance from an agricultural, economic, and social point of view."

R. S. TARR.

OBITUARY

SAMUEL FRANKLIN EMMONS. Dr. Emmons died in Washington on March 28. He was one of the foremost geologists of the United States. Although he had been in ill-health for some time, he continued until recently his duties as geologist of the United States Geological Survey with which he had been connected since 1867. He was born on March 29, 1841, was a graduate of Harvard in 1861, and studied at the School of Mines in Paris, 1862-64 and at Freiburg, 1864-65. He was associated with the geological exploration of the 40th parallel, in 1867-77, was a member of many scientific bodies both in this country and abroad, and wrote many scientific papers and monographs.

J. HAMPDEN ROBB. Mr. Robb, a Vice-President of this Society and for many years a member of its Council died on Jan. 21, 1911, at the age of 65 years. The Council at its meeting on March 16, placed upon record in behalf of the Society its appreciation of his worth and of the great loss which his death has brought to his family, friends and colleagues. "He showed continued care for the welfare of the Society, and by his endeavors and earnest character did much to promote its interests and encourage the interest of others."

PERSONAL

PROF. C. H. HITCHCOCK. The trustees of Dartmouth College have voted that Prof. Charles Henry Hitchcock be made Hall Professor of Geology Emeritus. He retired last year on the Carnegie Foundation Fund. A paper by Prof. Hitchcock "The Volcanø Kilauea" appeared in the *Bulletin*, (Vol. 41, pp. 684-91, 1909). In the same year he issued his book, "The Volcanoes of Hawaii."

DR. ARRHENIUS. Dr. Svante Arrhenius, the distinguished physicist of Sweden and Director of the Nobel Institute, Stockholm, is at present in this country. He lectured, on March 25th, before the Washington Academy of Sciences and the Philosophical Society of Washington, on "The Siderial Cultus."

PROF. J. PAUL GOODE. Prof. Goode of The University of Chicago has accepted an invitation from the Department of Education of the Philippine Government to deliver a series of lectures to the Teachers' Assembly at Bagino in May.

DR. GRENFELL. The Council of the Royal Geographical Society of London has awarded to Dr. Wilfred T. Grenfell the Murchison Grant in recognition of his contributions to the accuracy of the charts of the Labrador Coast and to our knowledge of the people and the resources of Labrador.

GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY)

BOOK REVIEWS AND NOTICES

AMERICA

The Transition in Virginia from Colony to Commonwealth. No. 96 of Studies in History, Economics and Public Law, edited by the Faculty of Political Science of Columbia University. By Charles Ramsdell Lingley, Ph.D. 218 pp. Longmans, Green & Co., New York, 1910.

A study of the American Revolution somewhat strictly within the limits of Virginia. The purpose of the book is chiefly to show the body of experience which the leaders possessed as they approached the year 1776, when independence was declared. A good bibliography is an important feature.

The Highlanders of the South. By Samuel H. Thompson. 86 pp. and illustrations. Eaton & Mains, New York, 1910. 50c.

The book is a plea for the expansion of mission work among the inhabitants of the Southern Appalachians from West Virginia to North Carolina. To interest the reader in his appeal, Mr. Thompson naturally describes the people, their characteristics, manners and customs, tells what they do for a living, and describes their services to the country. On a whole, they were friends of the Union in the Civil War, and they produced such men as Daniel Boone, and David Crockett who were important in the early development of the land.

The book is thus made interesting and serviceable to geographers and anthropologists. We have known comparatively little of these mountaineers, poor, illiterate, brusque as they are, most of them far from railroads and even school houses and churches; and yet they possess many sterling qualities. They may be greatly helped educationally and otherwise; and we know of no other book that so fully describes these people in their present condition and the geographical and other causes that have made them what they are.

The Conservation of Natural Resources in the United States. By Charles Richard Van Hise. xiv and 413 pp., 16 illustrations, maps and figures, addendum and appendices. The Macmillan Co., New York, 1910. \$2.

President Van Hise's book is a sane plea for conservation of natural resources so that they may "remain as nearly undiminished as possible" for succeeding generations. Each topic is considered with reference to present conditions and to suggestions for their improvement. Criticisms are constructive and specific and in all cases the remedy is recognized as being the more potent if upheld by public sentiment as well as by statutes. The aim of the book is to reach the man of affairs; it is not a text book or a source book in the subject of conservation.

Four chapters are given to the topics of mineral resources, water, forests, and land. There is a short concluding chapter on conservation and mankind.

Among the minerals, from the standpoint of conservation, coal and petroleum hold first place since, once used, they are forever gone. Moreover coal is commonly mined so as to make future recovery of the beds now unprofitable practically impossible. Better methods of mining, the utilization of culm [coal refuse and dust], combustion of smoke and increased use of the gas engine are advocated. Attention is called to the enormous waste in the production of petroleum and natural gas. In view of their importance the author recommends strong governmental regulation. In the case of the practically non-competing companies of the Pennsylvania anthracite fields, governmental regulation of prices and production is advocated. The restriction of petroleum exportation is advised.

The waste of petroleum and natural gas is all the more deplorable in view of the short productive period of the fields. Petroleum should be used largely for lubricating and lighting and not for fuel.

The large scale production of iron is in the hands of corporations that handle the ores in a way to conserve them. Moreover the present rate, so far as the United States is concerned, is not likely to hold its increment of increase. Stone and cement are being substituted for iron in much structural work and the author holds that construction work requiring iron must be near its maximum. Furthermore iron can be used repeatedly. Copper is also, on the whole, mined with little waste. Lead and zinc are wastefully mined and extracted and are only to a slight extent available for repeated use since so much is used in covering iron and in paints.

Water is treated mainly with respect to water power and to irrigation. We are using less than one-seventh of the possible power and an augmented use would decrease the consumption of coal. Since streams originate from a wide area and are concentrated in places available for power and irrigation, they are especially subject to control in the interests of the people. Full and prompt development, limited franchise and control of reservoirs are the main factors that should be kept in strict control. In connection with the topics here and also in case of the mineral deposits there are brief, non-technical discussions of origins and processes.

Dr. Van Hise estimates that of the original lumber nearly 75 per cent. is wasted in process of manufacture before reaching its final form, and, in addition, is the loss by forest fires. Reforestation, economy in cutting and manufacture are recommended. Another remedy advocated is a change in taxation. The prevalent method is to tax standing timber at present valuation, and thereby furnishes an incentive to immediate cutting. Van Hise urges that the main tax be levied only when the timber is cut.

Soil conservation is rightly recognized, as most important since the soil is the ultimate basis of the nation's life. Soil deterioration both mechanical and chemical is thoroughly discussed and the remedy suggested. The author goes so far that he would prohibit the exportation of mineral phosphates. Here more than elsewhere the remedy must come through public sentiment and education, since laws regulating tillage are obviously incapable of adequate enforcement.

Dr. Van Hise strikes a happy medium between a technical and popularized presentation. The book is concise, practical, readable. It is a useful contribution to a great movement.

F. V. EMERSON.

Outlines of Geologic History With Especial Reference to North

America. A series of essays involving a discussion of geologic correlation presented before section E of the American Association for the Advancement of Science in Baltimore, December, 1908. Symposium organized by Bailey Willis, compilation edited by Rollin D. Salisbury. xvi and 298 pp., with illustrations, diagrams and maps. The University of Chicago Press, Chicago, 1910. \$1.66.

In this volume are brought together a series of essays which "present in broad outlines a summary of certain phases of existing knowledge of North American geology." The essays have since been published in the *Journal of Geology*.

The first essay is by C. R. Van Hise, on the principles of classification and correlation of the pre-Cambrian rocks. After pointing out the fact that in any such classifications and correlation we lack the guide of fossils and so must depend wholly on physical criteria, the author discusses somewhat fully, ten of the more important of these criteria; and then outlines the general divisions of the pre-Cambrian rocks which they appear to justify. A second essay on the basis of pre-Cambrian correlation by F. D. Adams follows, to which is appended a discussion of both essays by the two authors.

In the next four essays the evolution of the palæozoic faunas and of the physical features of North America in palæozoic time are discussed by Walcott, Grabau, Weller, and Girty. The succession and range of the upper Palæozoic floras are treated by David White, and the faunal relations of the early vertebrates by Williston. The distribution of floras is indicated on maps by black rings and black dots which are curiously labelled "white rings" and "black rings" on one map (p. 149), "white rings" and "solid rings" on another (p. 153). On page 165 Williston gives a chart showing the geological range and distribution of the larger groups of air-breathing vertebrates.

The succession and distribution of the later Mesozoic invertebrate faunas is discussed by Stanton, that of the Mesozoic and Tertiary floras by Knowlton. Dall contributes a short essay on the conditions governing the evolution and distribution of Tertiary faunas which is of interest to geographers as well as geologists, for he deals with the influences exerted by temperature, light, salinity, and other physical conditions upon life, both past and present. The environment of the Tertiary faunas of the Pacific coast is the subject of an essay by Arnold which is accompanied by a table showing tentative correlations between the Tertiary formations of California, Oregon, and Washington. Osborn compares the mammalian life of American Tertiary formations with that of the standard European divisions, and presents a preliminary correlation of the deposits of this epoch on the two sides of the Atlantic. The fourteenth essay, by Salisbury, describes the physiographic changes which marked the close of the Tertiary, the effects of these changes on climate, the consequences which followed from glaciation, and the effects of these physical changes upon life. The essay by Macdougall on "Origination of Self-Generating Matter and the Influence of Aridity upon its Evolutionary Development," while discussing the geological aspect of the question to a limited extent, is not so presented as to emphasize that aspect and seems out of place in this collection. The volume closes with Chamberlin's lucid discussion of "Diastrophism as the Ultimate Basis of Correlation."

Special mention should be made of the paleogeographic maps by Willis. Fifteen of these are so distributed throughout the volume as to serve as illustra-

tions for many of the different essays, each map representing the condition of North America at some period of its geologic history. These maps add greatly to the value of the collection of essays, a collection which every geologist will find of much service.

D. W. JOHNSON.

Fruit Ranching in British Columbia. By J. T. Bealby, M.A. xi and 195 pp., 32 illustrations. Adam and Charles Black, London, 1909. 3s. 6d.

This book is written by an Englishman, evidently a scholar, who in search of health migrated to the Dominion and found what he sought in the out-of-door life of a grower of fruits. In addition, he gained experience, as much contentment as a refugee from home can expect and a moderate compensation for his labors. The scene of the book is laid in the Kootenay lake region near the Selkirk. In general, the story is a detailed account of the daily life of the fruit farmer. No incident is too insignificant or too irrelevant to be neglected but many of these are saved from being commonplace by the ability of the writer to pen an interesting word-picture. Valuable material concerning the climate of the valley, the animal life, the soil and the customs of the inhabitants is interspersed with accounts of successes in raising apples, cherries and berries. From the standpoint of the fruit grower, the book may serve as a prospectus of the region. Prices of land, the amount of capital required, the possibilities of the various kinds of fruit, the condition of the land, the yield per acre, the market and the market prices are carefully considered. The book is well illustrated.

R. M. BROWN.

Studies in the American Race Problem. By Alfred Holt Stone. With an introduction and three papers by Walter F. Wilcox. xxii and 555 pp. and index. Doubleday, Page & Co., New York, 1908. \$2.

This is the picture: The Negro is a great child, easily guided for good or bad, easily contented, not vicious, not prudent or thoughtful of the morrow. Such the black masses. He is a being inferior to his white neighbor in essentially taking care of himself. He cannot compete with the Caucasian at anything. In the cities of the North and East he has yielded his old-time place of newsboy, bootblack, coachman, waiter, barber and mechanic to Europeans who wanted his job, took it from him and did it better than he. The English coachman in New York takes better care of his horses than the black did. At Sunnyside, Arkansas, the Italian is beating him at his best task of cotton raising, working six acres a man to the black man's five, and taking 403 pounds of lint from it to the black man's 233.

This kindly, shiftless being finds in the southern white an adviser and helper. He is allowed to work at trades there from which the unions exclude him everywhere in the north. He knows and accepts his dependence, his inferiority, when agitators let him alone. A southern state isolated in the sea in 1865 with its blacks and whites would have known no race problems. The negro is not fit to direct by his ballot his white neighbor's affairs. He is not competent to manage his own. He does not desire the ballot. He is harder to get out on election day even than the northern voters who are never well represented at the polls with the best efforts of those interested. His voting is desired by unscrupulous persons who would purchase it. The educated class of so-called negroes consists mainly of mulattos. These are not an inferior race. They are not content to be treated as inferiors. Their Saxon blood will not assent. Some of them, like Booker Washington, advise the negroes with great

wisdom, others badly. These men suffer from the color line and labor for "negro" rights which the negro masses do not desire. Nowhere in the world does the white man allow the black or colored man to rule him. The northerner would not if there were enough of them to threaten it. Washington was disfranchised to prevent this at the hands of 100,000 blacks. So was Jamaica. If that be race prejudice all white men have it.

The negro is not increasing as fast as the southern white. There are hardly likely to be 24 millions of him at the end of the century, which seems to mean little more than ten by the thirteenth census. He may perhaps come to exist beside the white man happily and usefully as an inferior, *peasant* class in the southern states where he is to-day best treated and happiest. But all this demands time and—that he be let alone.

So hasty a sketch does injustice to this work of a southern cotton planter and economist. Mr. Stone was born in the south since the Civil War, is a cotton planter in the Yazoo delta of Mississippi, where there are nine blacks to a single white man. He has studied the relations of the races wherever they exist side by side. He knows negro opinion, southern opinion, northern opinion and foreign opinion. If not free from bias he is at least dispassionate and his work is a valuable contribution toward a fair expression of the best southern attitude.

MARK JEFFERSON.

Great Cities in America. Their Problems and their Government. By Delos F. Wilcox, Ph.D. xi and 426 pp. and index. The Macmillan Co., New York, 1910. \$1.25.

Dr. Wilcox's book should be entitled: "The Government of American Great Cities, and Problems Connected Therewith." The cities as such are simply not treated, except in some very incidental way. Of the city of St. Louis, for instance, there is this account: It is "situated in the heart of the Mississippi valley, surrounded by fertile and populous commonwealths," and again—"its half southern location" (p. 309). That is all. Of charter and municipal arrangements and civic reform there are thirty-seven pages. In justice to the author, let me say that he seems to have done excellently what he sought to do—describe government. It is proper to point out in a geographical journal, that a city is highly geographic, and no account of a metropolis that neglects to speak of its relation to the environment can be adequate. For Chicago a page is quoted from Dr. Goode in response to some feeling of this sort (p. 237). This feeling crops out again most of all in New York, which has a vastly important Bridge Department *because of its insular situation*. This again is seen to send the price of real estate skyward, like buildings, in the lower City. The fabulous wealth of the City is stated in paragraph 67, however, without recognition that it is by virtue of its relation to the resources of the whole nation. If Dr. Wilcox has read Brigham and Semple and Emerson on the significance of the city it is not apparent in his writing. He is doubtless aware of it, but should it not be explicit in an account of the city? An interesting geographic suggestion is in the contrast of Philadelphia's happy homes, based on abundant room for the city's expansion, and her content with corruption, which the home comfort contributes to by keeping the citizen away from efforts toward civic reform (p. 252), while New York's crowded tenements have been a sore that has kept reform movements alive. Even here the geographic basis is very much in the background. The port of New York seems hardly considered, unless we are satis-

fied with ferryboats! No word of the growing need of longer piers and the resistance of the War Department. No word of the Jamaica Bay and Montauk Point projects, yet some day, if Dr. Wilcox's account of Manhattan land values is sound, either of these may strike a terrible blow at the city's present wealth.

Washington, the ungeographic, the city by the will of the Nation, is returning to L'Enfant's plan. The existence of a plan is shown to be an advantage to Washington. An odd item is the honeycombing of the city's grandiose blocks with lanes of wretched dwellings of the poor, for whom L'Enfant's plan had no place.

MARK JEFFERSON.

Canada. The Land of Hope. By E. Way Elkington. viii and 239 pp., 32 illustrations, map and index. Adam and Charles Black, London, 1910. \$1.75.

He who would emigrate to Canada should read this book. Mr. Elkington appears to mean by his subtitle that the Canadians see their land not as it is but as they hope it will be. He has evidently looked closely for the truth about Canada. He finds she justifies the hopes. Canada is full of opportunities. There is room for a hundred million more people! The country has no end of resources. At present it is money more than men that it needs. Everywhere he finds things being undertaken with insufficient capital. Excellent wheat land abounds in Manitoba, Alberta and Saskatchewan; in the last province, free in 160 acre homesteads, but not within thirty or forty miles of the railway. It is better to buy land and get it nearer the rails. Do not buy government land nor of the real estate men; buy of the Canadian Pacific, or perhaps some of the other railroads. They want you to prosper and give them business.

Only the poorest farmers ever spend the winters on their farms in the west. The winters are bitter, though the Canadian will not suffer you to say so. For the Canadian he has no good word. The American is the only good farmer in Canada. The Canadians misrepresent everything, and if you ask for proof of their statements you are a knocker! Perhaps, as an Englishman, he reacts a little to the little estimation in which his countrymen are held throughout the colony, from Toronto, where "no Englishman need apply," to the Rocky Mountains. Canadians regard Englishmen as failures in Canada, and the author thinks the undesirables shipped out by steamship companies and charitable societies are likely to fail everywhere. He does not find the prairie towns attractive, in which he seems to the reviewer to show little appreciation of the conditions of frontier life. The Rockies are fine! In the "gloriously overrated Kootenays" no ranchers are making enough from their fruit to keep themselves in any degree of comfort. British Columbia has a climate that suits him and the people too are different from the Canadians. At Victoria, English ways are liked. It is the richest city in Canada but there is no chance to earn money there. If the mines and forests of British Columbia have not done well it is the fault of the people not of the country.

In general Canada has fashioned herself after America and fallen short.

MARK JEFFERSON.

En Haïti. Planteurs d'autrefois, Nègres d'aujourd'hui. Par Eugène Aubin. xxxv and 348 pp., 32 photo-engravings and 2 maps in colors. Armand Colin, Paris, 1910. Fr. 5.

The book tells of the experiences, observations, and studies of the author during his travels through the whilom French parts of Haïti. It does not claim

to be a geography of the country, for its chapters are merely a collection of letters previously written to the *Journal des Débats* and reprinted in book form; yet it must not be ranked with the average books on voyage and travel because, in spite of the apparently disconnected subjects, the author observes and writes with a special purpose, namely, to trace in the conditions of the present the influence and remnants of the French part of the island. It is very interesting to discover with him in how many respects French influences are still at work in the life of the people and how much the stamp of French civilization is imprinted to this day, on almost everything in the negro republic. It is not easy for us to imagine nowadays that Santo Domingo was once the most important and prosperous French colony in Central America, where the "habitant" raised indigo, sugar cane, and cotton near the coast, and coffee and cattle on the hills. The most illustrious names of old France are still found on these former "habitations." After the emancipation of the blacks, many of these families left the island previous to the massacre, and those who did not return to the old country emigrated to Cuba, Jamaica, Louisiana, and the United States. In this way the Carolinas, Virginia, Maryland, Delaware, Pennsylvania, New Jersey, and even New York and Massachusetts, received a very valuable influx of new citizens, for whose assistance funds were voted by the Federal, as well as many a State government. Those who made their fortunes there showed their gratitude to the Union in their turn: at Philadelphia, which was their favorite city on the Atlantic coast, the generous foundation of Étienne Girard still perpetuates their memory, Tulane University, too, was named after one of them, and the first scientific description of the island, a result of the combined efforts of refugees from France and Haïti on American soil, was published in Philadelphia by Moreau de St. Méry in 1796 and 1797; among its subscribers were John Adams, Jefferson, Kosciusko, Lafayette, Talleyrand, Volney, Rochambeau.

While thus the best scions of French civilization were grafted on a foreign stem, that which was left of it on the island could not help, in the course of time, to become fossilized, petrified. The almost complete exclusion of the whites from the new republic, which made the situation of the few that were tolerated similar to that of the whites in China or Japan in the early times, was, of course, the greatest obstacle to healthy progress either along the old lines or along new ones. With all their local patriotism, however, the Haïtiens could not entirely efface all vestiges of the past. To this day, the old sugar mills, the crumbling aqueducts and irrigation works, the stately portals of what were once residential manors, speak of the times gone by; almost all the place names are of French origin; the life and habits of the people are full of creole reminiscences; their own language, though corrupted to a degree as to be almost unintelligible, is still a dialect of French. The counterpart of this language is their religion, in which Christian and African elements are so blended as to make of it a cult which is neither the one nor the other, and which, under the name of Vaudoux, is clearly distinguished from the Christian cult proper whose preservation is the object of a number of Bretonish missionaries. A striking illustration of the Rip Van Winkle condition of the whole country is told by the author on occasion of his visit at one of the inland chapels where the reader, in conducting the service, read his prayers from a prayer book of the eighteenth century handed down to him by his predecessors, and in that office never failed to ask the blessings of Heaven for "his Majesty the King, her Majesty the Queen, and Monseigneur the Dauphin" in the year 1904 and, the author con-

tinues, "the believers of the place continue imperturbably to pray for these august personages in whom not many people will take an interest now in this nether world."

The book is full of interest for the anthropogeographer, ethnologist, and sociologist. M. K. GENTHE.

Through the Wildernesses of Brazil. By Horse, Canoe and Float. By William Azel Cook. ix and 487 pp., illustrations and index. American Tract Society, New York, 1909.

More than half of this book is taken up with an account of the author's first voyage as a distributor of bibles in central Brazil. His journey from Goyaz in the south to Maranhão was made by descending four north-flowing rivers, the Araguaya, Tocantins, Parnahyba, with eastward traverses between, and the Itapicurú, off to the west again. On the first two streams the journey was made by canoe, then on a raft of 1,200 small poles and on the Itapicurú by steamer, reached from Therezina on the Parnahyba by sixty-four miles of narrow gauge railroad through the wilderness. Through much missionary argument runs a thread of excellent narrative of the journey. The author was distributing bibles and makes no pretense to scientific knowledge or exploration. It is not always possible, in this or the later journey to distinguish what the author learned by his own powers of observation, which are good, from what he relates at second hand. A number of such references are frankly made. Photographs in this part of the book have no connection with the text. His picture of the degradation of the Brazilians of the interior does not differ from that of Wallace and other observers.

Another journey took the author at a later but unknown date west from Goyaz on horseback to Cuyabá, through the land of the Bororó, among whom he stayed and made collections for the Smithsonian. On this trip the camera added to the vividness of the narrative. From Cuyabá a disastrous trip was made northward into the rubber forests, from which Mr. Cook barely escaped with his life. The account of the rubber gathering is one of the best parts of the book for the geographer. The main theme of the book is missionary work, but there is much interesting reading in a popular way about the interior of Brazil. The style is bright and easy. There is no map. MARK JEFFERSON.

El Arbitraje entre las repúblicas de Bolivia y el Perú y su última negociacion sobre fronteras. Documentos Diplomaticos. Ministerio de Relaciones Exteriores de la República de Bolivia. 21 and CXXIX pp., map and index. Imp. Artistica, La Paz, 1909.

Treats at length of the final arbitration of the boundary dispute between Bolivia and Peru according to the treaty of La Paz, Sept. 17, 1909. The accompanying map shows the new boundary line. The *Bulletin* printed an article on the new boundary (Vol. 42, 1910, pp. 435-37), with a map of the boundary.

AFRICA

The Big Game of Africa. By Richard Tjader. XX and 364 pp., map, illustrations and index. D. Appleton & Co., New York, 1910.

One of the best hunting books. It deals with little else than African game animals and other fauna. Its description of their life and habits, advice as to the best way to hunt them, and the many stories of the author's experiences in

the greatest game land of the world will make the book peculiarly valuable to hunters. This information is supplemented by suggestions as to the selection of proper outfit, guns, cameras, curing materials, etc., with much definite data as to where, when and how the hunter may secure the game he wants. As Ki-Swahili is the *lingua franca* of that hunting land, the author gives a Swahili-English vocabulary with exercises that will help the sportsman to get some knowledge of the language which will be of great aid to him both in British and German East Africa. The author's wanderings and experiences, are unusually interesting and his work is one of the best guide-books for sportsmen visiting Africa. He highly praises the missionaries, who, he says, are training the negro along industrial lines and teaching him to better himself in all respects. The general reader, also, will find the book very entertaining.

Documents Scientifiques de la Mission Tilho (1906-09). Ministère des Colonies, République Française. Tome I, lx and 412 pp., Maps, illustrations and diagrams; maps in separate case, Nos. 1-8. Imprimerie Nationale, Paris, 1910.

Frequent references have been made in the *Bulletin* to the work of the Tilho Mission in the region of Lake Chad. This sumptuous volume published by the French Government, is wholly devoted to the scientific results of the studies and surveys. The volume will long be the authoritative source of information on the lake and the physical conditions that have led, in recent years, to the dessication of a large part of its area.

Les Bangala. (État Ind. du Congo). Sociologie Descriptive. Par Cyr. van Overbergh, avec la collaboration de Ed. de Jonghe. XV and 457 pp., map and index. Albert de Wit, Brussels, 1907. Fr. 10.

This book is the first of a series of similar works whose publication began in 1907. The idea originated in the Congress at Mons, Belgium, in 1905, where it was thought that a collection of works relating to studies of the manners and customs of peoples on lower planes of civilization would be helpful in view of the efforts now made to improve the condition of such peoples. The method used in preparing these works is to quote the information collected by the best observers and arrange it according to the various divisions of the topic. Some of this information in the present volume is not of special importance but on the whole the work gives a better idea of all that relates to the Bangala than can be found in any other one volume.

The Bangala, who occupy a large territory along the Middle Congo, gave Stanley his hardest fight when he descended the river and were long known as one of the important cannibal tribes.

The People of Egypt. Painted by Lance Thackeray. With an introduction by Gordon Home. VI and 10 pp., 32 plates in color and 37 illustrations in black and white. The Macmillan Company, New York, 1910. \$1.75.

The book has only ten pages of text in which various types of people are sketched. It is the illustrations, however, that justify this little volume. Mr. Thackeray has artistic ability, a keen sense of fun, and his plates in color and black and white drawings will be greatly appreciated. There is humor in all these drawings as well as keen characterization. Few artists could tell so much with pencil and brush of a great many phases of Egyptian life as Mr. Thackeray has done in this attractive book.

Mysterious Morocco and How to Appreciate It. By H. J. B. Ward, B.A. 268 pp., illustrations, map and index. Simpkin, Marshall, Hamilton, Kent & Co., Ltd., London, 1910. 2s. 6d.

The author gives much information about Morocco in handy form and his material is presented in a way to make the book very useful to travelers who are visiting Morocco in increasing numbers. He includes a sketch of the history of Morocco and an exhaustive bibliography. The work is noteworthy for its trenchant manner of presenting facts, its avoidance of dullness and the amount of information useful to travelers compacted in small compass and at the same time of general interest. Much of the material is derived from his own observations for Mr. Ward enjoyed some special opportunities for acquiring a good acquaintance with some parts of the country.

Uganda for a Holiday. By Sir Frederick Treves, Bart. XI and 233 pp., map, 72 illustrations and index. E. P. Dutton & Co., New York, 1910.

A book that should be read by all travelers who take the route over the British East Africa R.R. to Victoria Nyanza and Uganda. The work is specially valuable from the tourist point of view; and the number of visitors to inner Africa by this route is now steadily increasing. Among the best features are the description of the author's camping trip through the Great Rift Valley, the wonderful natural phenomenon which extends from near Lake Nyasa to the Red Sea. The immense table land was split by two parallel rifts running north and south, so that a block of material thirty to forty miles wide dropped vertically between them to a depth of some 2,000 feet. It was in this depression that Sir Frederick made a journey of some length on foot.

The book also contains one of the first accounts in English of a circumnavigation of Victoria Nyanza. Sir Frederick Treves took the steamer journey along all the coasts, and his description of the German stations is especially novel and interesting. The photo-engravings are excellent.

The author says that though sleeping sickness has made great ravages along the lake coast of Uganda, the tourist is in no danger. The fly which propagates the dread disease, travels only a short distance from water and must have the shelter of trees or low bush throughout his life. But all the ground around the landing place has been very carefully cleared of vegetation so that the *glossina palpalis* is not to be found on any Lake steamer. "The casual visitor therefore runs no more risk of sleeping sickness on the Uganda than he does of the Bubonic plague on the Upper Thames."

ASIA

L'Asia Centrale. Note di viaggio e studi di un diplomatico giapponese. By Nisci Tocugirò. Traduzione di L. Nocentini. Sotto gli auspici della Società Geografica Italiana. XX and 317 pp., map, appendices and index, Unione Tipografico-Editrice Torinese, Turin, 1911. L. 4.50.

The book is specially interesting as a geographical work by an Asiatic on portions of Central Asia which he visited and in part studied. The author was formerly Japanese Minister of Foreign Affairs. His book is introduced by an appreciative note from Signor Cappelli, President of the Italian Geographical Society, and the work has been translated and published under the auspices of that Society. It is not merely a book of travel, for notwithstanding the large

literature produced by many noted explorers and students on Russian and Chinese Turkestan, this work also makes some contributions to our knowledge of the geography and history of these parts of Central Asia. Its distinctive interest is that it often reveals to us the Asiatic point of view. Part I, is given to a systematic geographical account of the countries, peoples and products of these regions. Part II, to the history of Central Asia; Part III, to Afghanistan; and Part IV, to Northwestern Mongolia. The author undertakes so much in one octavo volume that his treatment is necessarily summary, but his facts are judiciously selected and the contents bear the impression of the trained geographer. The map is good and helpful.

Über das Verhältnis der Geschlechter in Indien. Bearbeitet nach amtlichem Material. Von Robert Kirchhoff. Heft IV: Statist. u. National-ökonom. Abhandl. Herausgegeben von Dr. Georg von Mayr. IV and 118 pp. and map. Ernest Reinhardt, Verlagsbuchhandlung, Munich, 1909.

A study based upon official data on sex conditions in India. The census of 1901 showed that in the British provinces and the native states the males exceeded the females by about 5,000,000 souls in a total population of 294,361,056. In other words to every 1,000 males there were 963 females. The author believes that many of the women were not counted in the census returns partly on account of the seclusion of a great number of them, particularly among the Mohammedans, and also because less care was given to the enumeration of the females. The Indian marriage system is discussed and also the many influences that fix the social position and shape the life history of Indian women. A careful study based upon the most reliable data available.

Dawn in Toda Land. A narrative of missionary effort on the Nilgiri Hills, South India. By C. F. Ling, with a foreword by Amy Wilson-Carmichael. XI and 90 pp., and illustrations. Morgan & Scott, Ltd., London, 1910.

The Todas are a small tribe found only on the Nilgiri Hills and numbering less than 800 souls. They have no traditions as to their origin. "We came from nowhere," they say; "we have always been here." They are a fine race physically, taller and fairer than the people of the plains, neat and orderly and live by grazing large herds of buffalo. The book tells the story of these simple and isolated people and of the successful efforts of missionary teachers in the past fourteen years to improve their condition.

Ceylon. By Alfred Clark. VIII and 88 pp., map and illustrations. In the Series "Peeps at many Lands." The Macmillan Co., New York, 1910. 75c.

The book gives in brief compass clear impressions of the most noteworthy aspects of Ceylon. A great deal of striking information is compacted in 87 pp., for there is no waste language. At the same time the work is very readable and the twelve full-page pictures in colors illustrate effectively the natives and various phases of Ceylon.

The Burman, His Life and Notions. By Shway Yoe. XXXIV, 589 pp. and index. Macmillan & Co., Ltd., London, 1910. \$3.25.

It is rare that any author of the definitive work on any topic of which he is master has enjoyed the opportunities of successive revisions at considerable intervals whereby he has been able to maintain his superiority despite the shift of conditions. That has been the fortune of the author of this intimate study of

the Burman, a classic from its first printing. First published in 1882 it took immediate rank as the one authoritative study of not only the Burman but of the Turanian life and character. As such the present reviewer recalls with gratitude the light which it shed upon the daily life of Mandalay and Rangoon in the land of the yellow robe and the honorific umbrella. After fourteen years the author was able in a second edition to correct errors, not that many such were found by the severest critics, and to add new matter. After a second interval of fourteen years, in which Burma passed from under the bloody and slothful rule of Thibaw into the hands of competent British administration, the author has rewritten his book with an eye carefully directed upon the immediate results of the change of conditions. In all human probability this will be the final edition, for in the passage of the years the hand of the administrator must weary and he must lay his task aside. It is meet, therefore, to disregard the modesty of the title page and for Shway Yoe to read the distinguished name of Sir James George Scott, one of those able men who have passed from the crowded masses of Scotland to become great proconsuls at the verge of British empire. In this last edition the author has yielded his own judgment in the matter of transliteration and has adopted the system formulated by the Royal Geographical Society; this concession makes for uniformity, but it does not avail to clear away the difficulties of the language and cannot compare with the beautiful precision of the scientific alphabet which by simple means has been found so ready of application to other tonal languages. We could wish that Sir James had shown himself equally complaisant in sacrificing his translations of Burman verse into English doggerel, but that is probably too much to ask any one who finds that he has a facility in rhythm and in rhyme. The blemish is but slight in a work where so much is found to transcend all praise. It is not merely the story of the Burman in his religious and in his social and his civil life, so far as life is at all dissociable from religion in a community where the chief end of living is to attain merit whereby one more step is taken toward Ne'ban or Nirvana. In the lapse of years the same witness has been able to present the old Burman as he was before the rule of the Lord of the White Elephant had passed, and the new Burman who is struggling toward adjustment to meet the new conditions.

WILLIAM CHURCHILL.

GENERAL

The Conservation of Water. By John L. Mathews. 289 pages and illustrations. Small, Maynard & Co., Boston, 1910.

This book sustains the standard set in "Re-making the Mississippi." It is an interesting and instructive exposition of the value of the streams of the country. Chapters on Water as a Resource, Floods and Flood Prevention, Storage, Municipal Supply, Water Power, Swamp Drainage, Irrigation and the Conservation of our soil are included, and any one who desires to obtain a presentation of the conditions now existing as well as some of the tendencies can do no better than to read this book. Many of the nation's extravagances and inconsistencies are displayed, as, for instance, the pollution of streams used for a water supply. We have been profligate of our heritage. The tale is a much-repeated one, but we cannot be told too often of our failings, to the end that we may see our errors not only as pertaining to large rivers, like the Mississippi, and to extensive projects, like the Uncompahgre, but also as the personal factor in smaller rivers, swamps, hillsides and wooded tracts of our own immediate neighborhood.

Mr. Mathews's indictment is a severe one; but students of our great river are not agreed that the reservoir system of control can be carried out as extensively as is here recommended and the "mining of white coal" is not altogether an ethical argument, for it excites the same desires which have made this great waste possible. Moreover, we have no conclusive evidence that the reforestation of large areas will increase our rainfall, nor do we believe that without the electricity obtained from the power of the water held in reservoirs by which nitrogen can be added to the soil we are in danger of starvation when the nitrate deposits of the Atacama desert are exhausted.

A number of fine illustrations add much to the value of the volume. Persons interested in the conservation of water will read this book, of course; but it ought also to fall into the hands of the lukewarm and the disinterested readers of conservation problems, for the careful consideration of the material presented in this book must make them active agents in small or large ways in this great national movement.

R. M. BROWN.

Lehrbuch der Geologie. Von Dr. Emanuel Kayser. In zwei Teilen. I. Teil: Allgemeine Geologie. xii and 825 pp., 598 text figures and index. II. Teil: Geologische Formationskunde. x and 741 pp., 90 plates and 150 text figures. Large 8vo. Third Edition. Ferdinand Enke, Stuttgart, 1908 and 1909. M. 18.60.

The general structure of this third edition of Professor Kayser's well-known textbook is the same as that of the two previous editions, but the text has been enlarged and re-written in many places according to the progress of geology along the respective lines, up to 1908. The most important of the chapters thus modified are, in the first volume (Physical and Dynamic Geology). Earthquakes, mountain making, valley terraces, glacial erosion, marine sediments, and others; in Part II (Historical Geology), it is especially the Archaic, the Alpine Triassic, the Upper Cretaceous, Tertiary, and Quaternary. The merits of the book, from the standpoint of the teacher or student, still consist in the exceptionally great number of illustrations, especially of plates representing the leading fossils of which no other similar book possesses a better and more complete selection, and the historical synopsis of the progress of our knowledge about the contents of the respective chapters at the beginning of each. Pedagogical considerations, too, have led to the very strict confinement of the book to problems of German geology, assigning the corresponding phases of foreign countries comparatively little space. This plan has resulted in a much more explicit treatment of German conditions than is found in the average textbook, and it makes the book an especially welcome guide to German geology for the foreigner who can find in it all that he can be possibly expected to know or to need of the matter, and in a most accessible form. For students who want to know more about foreign conditions, however, references are given at the end of each chapter, which amply supplement the short sketches of the text. As the most recent edition of any of the German standard textbooks this one is probably the first in which the new hypothesis on the formation of the Alps by a recumbent fold process has been written up in textbook size. It is surprising, however, that notwithstanding its being brought up to date, the book should, in the introduction, still cling to the nebular hypothesis as the only existing, or acceptable, hypothesis of its kind, without even mentioning the meteoric or planetesimal hypotheses, although the author declared, as far back as the preface to the first edition, that he intended to at least touch upon doubtful subjects, even though he would not enter into merely theo-

retical discussions. In the discussion of the causes of the glacial period, too, mention at least should have been made of the pendulation theory, while it is strange that in the treatment of the Upper Cretaceous of Saxony, Hettner's work is not mentioned. As an example for submarine river beds, the classical one of the Hudson ought not to be omitted (p. 611).

It is hard to understand that such an eminent scientist as Professor Kayser should have fallen a victim to the anglophobia of a clique of German geographers who have undertaken to reform the spelling of English proper names in accordance with the rules of German orthography to such a degree as continuously to spell the Empire City *Neuyork*. But the situation is not without its humor when one notices, on the other hand, that he as tenaciously clings to the use of the English common noun *bed* unchanged and untranslated where every German whose Sprachgefühl is not yet infected by the patriotic spelling-bacillus would simply say *Bett*, or *Schicht*.

M. K. GENTHE.

The History of the Telephone. By Herbert N. Casson. vii and 315 pp., and illustrations. A. C. McClurg & Co., Chicago, 1910.

The complete story of the telephone is well told in these pages. For some years after Dr. Alexander Graham Bell's great discovery the new-born art of telephoning was neglected and ridiculed. To-day 3,000,000 telephones are scattered abroad in foreign countries and 7,000,000 are operated here, where the new art was born.

NEW MAPS

NORTH AMERICA

UNITED STATES GEOLOGICAL SURVEY MAPS

TOPOGRAPHIC SURVEY SHEETS:

California: Wheatland Quadrangle, 1:31,680. Contour interval, 5 ft.

Colorado: Leadville Special Map, 1:9,600. Interval, 25 ft.

Indiana: Clay City Quad., 1:62,500. Interval, 20 ft.

New Mexico: Fort Bayard Special Map, 1:12,000. Interval, 10 ft.

Oklahoma: McComb Quad., 1:62,500. Interval, 20 ft.

Washington: Mt. Vernon Quad., 1:125,000. Interval, 50 ft.; Quincy Quad., 1:62,500. Interval, 25 ft.; Winchester Quad., 1:62,500. Interval, 25 ft.; Red Rock Quad., 1:62,500. Interval, 25 ft.

Washington-Idaho: Pullman Quad., 1:125,000. Interval, 50 ft.

West Virginia: Sutton Special Quad., 1:62,500. Interval, 50 ft.

Wisconsin: Fond du Lac Quad., 1:62,500. Interval, 10 ft.; Neenah Quad., 1:62,500. Interval, 10 ft.

UNITED STATES. Topographic and Geologic Index Map showing Progress in Surveying and Engraving. Topographic Maps and Publishing Geologic Folios to Jan. 1, 1911. 3 sheets. 1:2,500,000 = 39.46 miles to an inch. 3 colors. Washington, 1910. [Unsurveyed areas white. 5 colored symbols used for areas surveyed: (1) maps not yet engraved, (2) maps engraved and published, (3) geologic folios in course of publication, (4) maps engraved, geologic folios published, (5) miscellaneous surveys.]

ALASKA. (a) Map showing relation of Alaska Coal Fields to Transportation Routes. 1 inch = 170 miles; (b) Reconnaissance Map of S. W. Part of Kenai Peninsula. 1 inch = 12 miles. [Shows distribution of gold, copper chronic

iron, and coal mines or prospects.]; (c) Geologic Reconnaissance of the Iliamna and Lake Clark Region. 1:750,000 = 11.84 miles to an inch; (d) Geologic Sketch Map of Northeastern part of Fairbanks Quad. 1 inch = 13 miles; (e) Map of Koyukuk-Chandalar Region. 1:750,000; (f) Map of Nulato-Council Region. 1:1,000,000 = 15.78 miles to an inch. [Shows distribution of gold placers and coal.] All maps black. Illustrate papers in *Bull.* 442, Washington, 1910.

U. S. COAST AND GEODETIC SURVEY CHARTS

Corrected or new editions of charts: *Alaska*. Bristol Bay: Nushagak Bay and Approaches. No. 9,050. Shelikof Strait and Afognak Island. 8,555. *California*. San Francisco Entrance. 5,532. 1:40,000. *Connecticut*. North Shore of Long Island Sound Fairfield to Georges Rock. 266. 1:10,000. *Massachusetts*. Newburyport Harbor. 331. 1:20,000. *Maine*. St. George River and Muscle Ridge Channel. 312. 1:40,000. *New Jersey*. Raritan River from Raritan Bay to New Brunswick. 375. 1:20,000. *New York*. Huntington Bay Long Island Sound. 368. 1:30,000. Montauk Point to New York and Long Island Sound. 52. *North Carolina*. Albemarle Sound (western part) from the Pasquotank River to the Roanoke and Chowan Rivers. 141. 1:80,000; Pasquotank River. 407. 1:60,000. *Virginia*. Sheet No. 1. James River. Hampton Roads to Point of Shoals. 401^a. 1:40,000. *Virginia and North Carolina*. Atlantic Coast from Cape Henry to Cape Lookout. 10. 1:400,000. *Washington*. Willapa Bay. 6,185. 1:40,000. *Philippine Islands*. Inland Waters south of Luzon. Ragay Gulf to Tayabas Bay. 4,218; Samar and Leyte. Calbayog to Tacloban. 4,420. 1:100,000 (with inset of Catbalogan Harbor, 1:35,000). Negros and Cebu. Northern part of Tañon Strait. 4,428. 1:100,000; West Coast of Luzon. Manila Bay to Candon Point. 4,712; Panay, Negros, and Cebu with parts of Bohol and Masbate. 4,718. *Porto Rico-East Coast*. San Juan Passage to Port Humacao and western part of Vieques Island. 917. 1:40,000.

U. S. HYDROGRAPHIC OFFICE CHARTS

Pilot Chart of the North Atlantic Ocean, March, 1911.
Pilot Chart of the North Pacific Ocean, May, 1911.

U. S. WEATHER BUREAU CHARTS

Meteorological Chart of the North Atlantic Ocean. April, 1911.
Meteorological Chart of the North Pacific Ocean. April, 1911.
Meteorological Chart of the Indian Ocean. April, 1911.
Meteorological Chart of the Great Lakes. April, 1911.

AMERICA. Verbreitung von Steinschleuder und Blasrohr in Amerika. 1:40,000,000 = 631.3 miles to an inch. 4 colors. Illustrates "Die geographische Verbreitung des Blasrohrs in Amerika," by Dr. G. Friederici. *Pet. Mitt.*, 57 Jahrg., Feb.-Heft, Gotha, 1911. [Shows what is now known of the distribution of the sling and the blowpipe among primitive Americans.]

UNITED STATES. Ergebnisse der Volkszählung in den Vereinigten Staaten von Amerika am 15. April 1910. Entworfen von Hugu Wichmann. 4 maps on one sheet. Colors. I. Volksdichte und Grossstädte 1910; II. Zunahme der Gesamtbevölkerung in Proz. 1900-1910; III. Städtische Bevölkerung 1910; IV. Zunahme der ländlichen Bevölkerung 1900-1910. Illustrate "Ergebnisse des 13. Zensus der Vereinigten Staaten von Amerika" (same author). In *Pet. Mitt.* 57 Jahrg., März Heft, 1911, Gotha. [A first-rate graphic representation of some of the striking results of our last census. Map I uses 7 symbols to show density of population. According to the 13th census our most densely peopled states are Rhode Island, Massachusetts and New Jersey, with over 100 population to the square kilometer, the most sparsely peopled being Nevada, Arizona, Montana and Wyoming with less than one inhabitant to the square kilometer. Map II shows that the increase in population has been largest in Oklahoma, Idaho and Washington, over 100 per cent., Iowa alone having declined in population, while the increase in New Hampshire and Vermont was only 5 per cent. or less and in Indiana, Kentucky, Tennessee and Missouri the increase was only 5.1 to 10 per cent; Map III, shows in white, the states of Mississippi, New Mexico, Arizona, Nevada, Idaho, Wyoming, North Dakota and South Dakota,

which contain no cities of more than 25,000 inhabitants. On Map IV, the New England States, New York, Southern Michigan, Iowa, and Missouri are shown in white as states which have declined in the last census period in rural population.]

CANADA. British Columbia. Part of the Selkirk Range Adjacent to Mount Sir Sandford. 1:125,000=1.97 mile to an inch. 3 colors. By Howard Palmer. Illustrates "Explorations About Mount Sir Sandford, B. C." same author. *Geogr. Journ.*, Vol. 37, No. 2, 1911, London.

CANADA. Portions of Alberta and Saskatchewan explored in 1908-9. 1 inch=15 miles. 2 colors. With Report of Frank J. P. Crean, C. E., "New Northwest Exploration." Dept. of Interior, Ottawa, 1910. [Text in red shows the nature of soils, distribution of timber, agricultural lands, etc., north of the surveyed parts of Alberta and Saskatchewan to the 57th parallel.]

CENTRAL AMERICA

PANAMA. Map Showing Canal Zone, Location and Auxiliary Structures of the Isthmian Canal. 1:80,000=1.26 mile to an inch. From Surveys of the Isthmian Canal Commission and Panama R.R. Co. Culebra, Canal Zone, 1909. [Black for features existing when map was made and red for features in course of construction or projected, such as canal, dams, locks, etc.]

AFRICA

BRITISH EAST AFRICA. East Africa Protectorate. (a) Map (provisional) showing areas covered by triangulation. 1 inch=52 miles. 3 colors. (b) Map (provisional) showing areas covered by topographical survey. 1 inch=52 miles. Illustrate "*Ann. Rep. Surv. Dept. of British East Africa*," for 1910. Nairobi.

ASIA

INDIA. Chart Illustrating Tibetan Invasion of Mid-India in 647 A. D., by L. A. Waddell. 1 inch=34 miles. Black. Illustrates "Tibetan Invasion of India in 647 A. D. and its Results," same author. *Imperial and Asiatic Quart. Rev.*, Vol XXXI, No. 61, Woking, England, 1911.

INDIA. Das Verhältnis der Geschlechter in Indien. 1 inch=128 miles. 12 colored symbols. Illustrates "Über das Verhältnis der Geschlechter in Indien." By Dr. Robert Kirchoff. *Statist. u. Nationalökonomische Abhandl.*, Heft IV, Ernst Reinhardt, Munich, 1909. [The colors are used to show the distribution and number of females to every thousand males in India according to the Census of 1909.]

MESOPOTAMIA. Ewald Banse's Reise im nördl. Mesopotamien. 1908. (Mössul-Nisib). 1:500,000=7.89 miles to an inch. 3 colors. Illustrates "Durch den Norden Mesopotamiens (von Mardin über Urfa und Biredschik nach Nisib, April, 1908)." In *Pet. Mitt.*, 57 Jahrg., März Heft, 1911, Gotha. [The region traversed between the Euphrates and the Tigris is, except at its eastern end, north of the projected route of the Bagdad R.R. and has thus far been inadequately mapped. This route map shows all wadis crossing it, many new place names, distribution of geological formations and agriculture with profiles and sketches of land forms.]

PERSIA. Theodor Strauss' Reiserouten im westlichen Persien. Ergänzung zu der Karte im Jahrgang 1905, Tafel 21. 1:600,000=9.46 miles to an inch. 4 colors. Insets: Kirmanschah und Umgebung, 1:300,000; and Sketch Map of Persia, 1:7,500,000. With "Eine Reise im Westlichen Persien," by Vice-Consul Th. Strauss. *Pet. Mitt.*, 57 Jahrg., Feb. Heft. Gotha, 1911.

AUSTRALASIA AND OCEANIA

QUEENSLAND. Geological Map of South East Moreton Coal Measures. 1 inch=1 mile. 5 colors. With *Rep.* No. 225, by E. O. Marks, Geol. Surv., Brisbane, 1910. [Ten colors and signs show geological formations.]

QUEENSLAND. Geological Sketch Map of the Northern Part of the Annan River Tin Field. 1 inch = 80 chains. By Lionel C. Ball. Assist. Govt. Geol. 3 colored symbols for geological formations. Geol. Surv. of Queensland. No. 222, Brisbane, 1910.

QUEENSLAND. Sketch Map of East Central Queensland. Gold Mineral and Coal Fields, between Rockhampton, Gladstone, and the Dawson and Mackenzie Rivers. 1 inch = 4 miles. By W. H. Greenfield. 3 colors. Publ. No. 226, of Geol. Surv., Brisbane, 1910.

SOUTH AUSTRALIA-WESTERN AUSTRALIA. Geological Sketch Map of the Country along Route of Proposed Trans-Continental Railway. 1 inch = 20 miles. By C. G. Gibson. In colors. Illustrates paper, same name and author, published as *Bull.* 37, Geol. Surv. of W. Australia, Perth, 1909. [This survey was extended through the little known "Great Victoria Waste" to ascertain the practicability of linking the railroad systems of Western and South Australia and thus completing the East-West Trans-continental R.R. As reported in the *Bulletin* (Vol. 42, p. 912) the survey established the practicability of the route and the railroad will probably be built at an early date. The map shows the greenstones, limestones, and granite rocks composing the surface geological features, establishes many elevations, and indicates the nature of the desert vegetation. Assistant Geologist Gibson in his report, says that the mineral possibilities lying within a 70 to 80 mile radius of the proposed line are found within the first sixty-nine miles of the surveyed line in Western Australia.]

VICTORIA. 1 inch = 8 miles. 8 sheets. 13 colors. Geologically compiled and colored by Robert Everett, Mining Dept., Melbourne, 1902. [The standard geological map of Victoria. An inset gives table of colors and explanations of the various formations, the characteristic forms of fossils, etc. Cultural as well as geological data are given.]

EUROPE

AUSTRIA-HUNGARY. Schulwandkarte des Herzogtums Steiermark. Bearbeitet von Joh. Georg Rothaug und Hans Trunk. 1:150,000. 6 sheets. G. Freytag & Berndt, Vienna, 1910. Linen, on rollers, K. 30. [One of the superior school wall maps for which Freytag & Berndt are noted. The physical features are very clearly brought out by contrasts of light, shade and colors, the map is not overweighted with political detail, and all information can be clearly seen from the rear benches of a large class-room.]

AUSTRIA-HUNGARY. (a) Orientierungsplan von Wien. 1:15,000 = 0.23 mile to an inch. 60 Heller. [With alphabetical list of streets, etc.]; (b) Verkehrsplan der k.k. Reichshaupt und Residenzstadt Wien. With plan of Floridsdorf. 1:15,000. 8 colors. [Contains very full information as to transportation in Vienna, index to streets, plan of house numbering and a sketch plan of Vienna in 1:150,000.] G. Freytag & Berndt, Vienna, 1911. K. 1.20.

ITALY. Carte d'Italia. 1:200,000 = 3.1 mile to an inch. Sheets. Genova, Folio 24; Spezia, F. 25; Modena, F. 26; Bologna, F. 27; S. Remo-Porto Maurizio, F. 29. Istituto Geografico Militare, Florence, 1910. L. 1.50. [The *Bulletin* commented, (Vol. 41, p. 534) on the excellence of this new map of Italy, based on original survey sheets in 1:25,000 and 1:50,000. The map, when compared with the official map of Italy in 1:100,000 printed in black, strikingly shows the advantage of using colors in cartography. Brown contours with interval 100 meters, show the relief, combined with brown shadings for the high and olive green for the low lands with glaciers and rivers in blue, railroads and roads in black and red, names and other details in black. For general purposes this promises to be the most useful map of Italy.]

ITALY. Schizzo Geotettonico dello Appennino settentrionale e centrale, secondo i rilevamenti geologici di Federico Sacco. 1:1,700,000 = 26.83 miles to an inch. Black. Illustrates "L'Appennino settentrionale e centrale," by Prof. Sacco. *Cosmos*, Serie II, Vol. 13, Rome, 1911.

RUSSIA. Map Showing the Distribution of Population and the location of towns in European Russia. 1 inch = 170 versts. 2 colors. (In Russian). By Benjamin P. Siemenoff. Illustrates "Town and Village in European Russia,"

by the same author. *Zapiski Statist. Branch I. R. Geogr. Soc.*, Vol. 10, No. 2, 1910, St. Petersburg. [Density of population is shown in red, and ten black symbols indicate forests, waste lands, distribution of population in mining regions, boundaries of the black earth region, etc.]

TURKEY. Turkey in Europe, Eastern and Central. 1:250,000=3.95 miles to an inch. 10 sheets. In colors. Geogr. Sect. Gen. Staff, War Office, London, 1910. [Approximate contours are shown at 250 ft. vertical interval, but above 2,000 ft. the vertical interval is 500 ft. An immense variety of information is given.]

TURKEY IN EUROPE. Empire Ottoman. Carte statistique des Cultes Chrétiens. 1:600,000=9.46 miles to an inch. Dressée par R. Huber, Major e. r. 4 sheets. Imprimé chez Baader & Gross, Le Caire. No date. 10s. [This is the latest edition of Major Huber's statistical, ecclesiastical, ethnographical, and historical map of European Turkey. Fifty-four colored symbols are used to express the ecclesiastical data including the distribution of schools under the various religious sects. Inset tables give information relating to schools, etc. Major Huber's work is of the highest value in its particular field.]

POLAR.

ARCTIC. Cotidal Lines for the Arctic Region. Polar Projection. Black. By Rollin A. Harris. Illustrates "Arctic Tides," Coast and Geodetic Surv., Wash., 1911.

ATLASES.

Atlas Universel de Géographie. Ouvrage commencé par Vivien de Saint-Martin et continué par Fr. Schrader. (a) No. 48, Mongolie. 1:5,000,000=78.91 miles to an inch; (b) No. 62, Maroc. 1:2,500,000=39.46 miles to an inch; (c) No. 67, Égypte et Soudan Égyptien. 1:5,000,000. Insets: Alexandrie et ses Environs, 1:250,000 and Le Caire et ses Environs, 1:250,000. Hachette et Cie, Paris, 1911. Each sheet 2 Fr. [Fine specimens of scientific map compilation and engraving with lists of cartographic sources on which the sheets are based.]

Atlas général Vidal-Lablache. 420 cartes et cartons, Index alphabétique de 46,000 noms. Librairie Armand Colin, Paris, 1909. [This popular French Atlas was first issued in 1894. In the present edition all the sheets have been brought up to date and many of the leading maps have been produced on a larger scale. The work is fully worthy of the popularity which it enjoys in France.]

A List of geographical Atlases in the Library of Congress. With bibliographical notes. Compiled under the direction of Philip Lee Phillips, Chief, Division of Maps and Charts. Vol. I, Atlases. XIII and 1208 pp.; Vol. 2, Author List, Index. pp. 1209-1659. Gov't Printing Office, Washington, 1909.

This work is a revelation of the importance of atlases in literature and research, and of the scope of material now available in atlas form. While much more than a list of geographical atlases to be found in 1909 in the Congressional Library, it perhaps should not be called a bibliography, but in its bibliographical notes it gives a wealth of information about many of the atlases listed.

There are in the library, over 3,400 atlases, ranging from little pocket and school atlases of a few generalized maps to great works containing scores of detailed, accurate, maps bound in several volumes; and from atlases dated in the twelfth century to those of 1909; atlases astronomical, cartographical, commercial, ecclesiastical, geological, historical, ethnographical, physical, and political; business, military, and real estate atlases and plat-books; general atlases, atlases of discovery, of exploration, of boundaries; atlases of countries, states, counties, cities, colonies; of oceans, harbors, rivers, railroads; of crops, forests, and other resources; of religions, diseases, and various vital statistics. There is one relief atlas for the blind.

Not only is there this broad range in subject matter, but in language as well. The ancient classical languages appear, with most of the modern European tongues, beside a generous portion of works in English.

The contents of the two volumes are arranged under the following heads: The World, special and general; the Continents, and under each their countries; under the United States—special, are given twenty-two classes as follows:

—Agricultural, Bankers and Brokers, Boundaries, Canals, Cities, Coal, Coasts, Commercial, Diplomatic, Forestry, Geological, Hieroglyphic, Historical, Lakes, Political, Railroads, Reproductions, Rivers, Roads, Statistical, Wars and Weather; then come the State atlases with nearly every state represented; and under the States, the various county atlases, city atlases, and plat-books. For the state of Ohio 91 atlases are listed, for New Jersey 60, and for New York, 137.

Besides the list of atlases arranged geographically and covering 1,200 pages, there is an author list covering over 100 pages and an elaborate index of 350 pages. Each atlas has a serial number to facilitate cross-reference.

Some of the most interesting atlases are those of reproductions of old maps and charts. Some thirty-five to forty of this nature are listed, among which are Fischer's collection of world maps and nautical charts from originals in the libraries of Milan, Florence and Venice, (in Italian); Jomard's Monuments of Geography, (in French); the great works of Nordenskiöld including his Periplus, (in Swedish and in English translation); and Santarem's Atlas, (in French).

As sources of geographical knowledge this collection of books constitutes almost an inexhaustible storehouse and for comparative studies where physical feature, climate, or natural resources are set over against, industries, crops, population and other statistical matter nothing could be better; with the atlases covering so wide a range of industries, correlations among industries might make splendid studies; and with many maps of the same regions at dates widely scattered a study of the progress of exploration or knowledge, and of the shifting of boundaries, population and industries, could be carried on with important results.

G. D. HUBBARD.

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NORTH AMERICA

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No. 5

GLACIERS OF PRINCE WILLIAM SOUND
AND THE SOUTHERN PART OF THE
KENAI PENINSULA, ALASKA

II.—GLACIERS OF PORT WELLS, PRINCE WILLIAM
SOUND*

BY

U. S. GRANT AND D. F. HIGGINS

COLLEGE FIORD

Pushing westward from Unakwik Inlet and the Meares Glacier one makes his way through the picturesque passage between Esther Island—a bold mountainous mass of granite—and the mainland into the waters of Port Wells (Fig. 1). Port Wells with its two large arms, College and Harriman fiords, forms the extreme north-western part of Prince William Sound. The valley in which Port Wells lies is a very extensive one, reaching from the front of the Harvard Glacier south-southwest through Cochrane Bay to the head of Port Nellie Juan, a distance of 56 miles at sea level. The same straight depression is continued for an unknown distance both north-northeast and south-southwest of the points named. On the east side of College Fiord, two or three miles inland, one sees the Amherst and Crescent glaciers which, from the water, appear to be the same as when they were photographed by the Harriman Alaska Expedition in 1899. About the head of College Fiord (Fig. 2) clusters a group of large and exceedingly interesting glaciers. Most of these were named by the Harriman Alaska Expedition after various colleges, and we have added similar names (Williams, Dartmouth,

* Published with the permission of the Director of the United States Geological Survey.

The first article in this series appeared in the *Bulletin*, Vol. 42, 1910, pp. 721-738. A general map of Prince William Sound, showing the location of the various fiords and bays noted below, accompanied that article.

Holyoke, Barnard, and Baltimore) to the larger remaining glaciers. Along the western side of College Fiord is a lofty mountain range, the prominent peak at the south end of which is named in honor of Professor B. K. Emerson who visited this district in 1899.

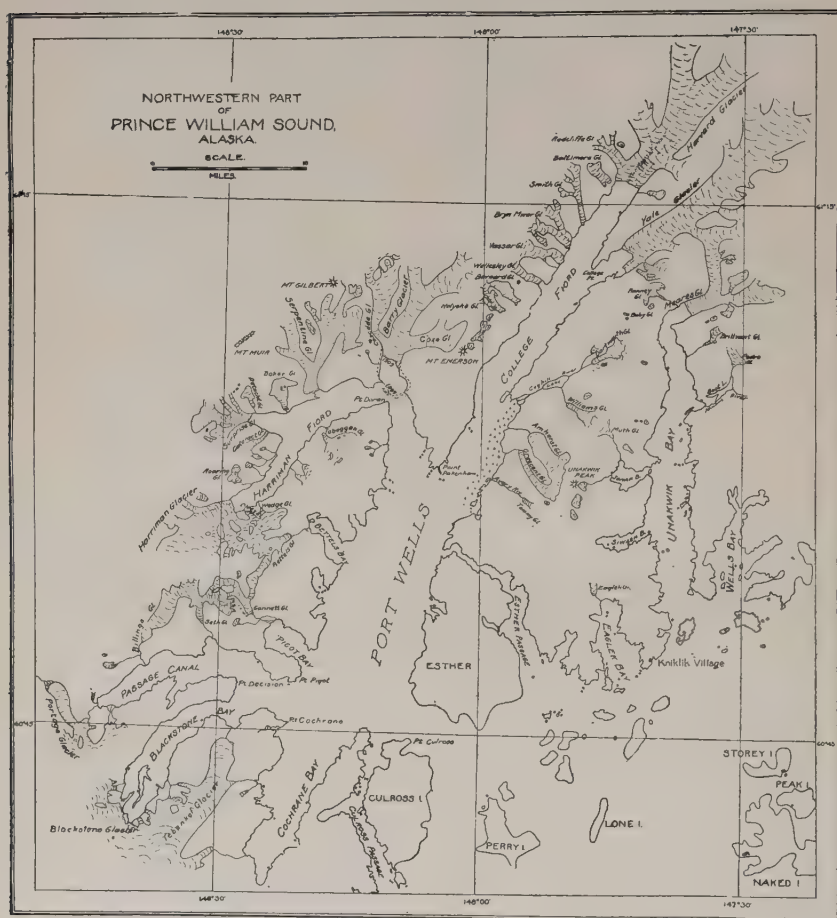


FIG. 1.—Map of the northwestern part of Prince William Sound, July, 1909.
Scale, approximately, 12 miles to 1 inch.

YALE GLACIER

The first account of the Yale Glacier was written by Mendenhall* in 1898. In 1899 the glacier was visited by the Harriman Alaska Expedition and described by Gilbert.† In 1905 we made a

* Mendenhall, W. C., A Reconnaissance from Resurrection Bay to the Tanana River, Alaska, in 1898: 26th Ann. Rep. U. S. Geol. Survey, pt. 7, 1900, pp. 273, 325.
† Harriman Alaska Expedition, vol. 3, 1904, p. 83.

hasty visit to the east arm of College Fiord, and in 1909 spent about half a day in the vicinity of the Yale Glacier.

Notes and photographs by both Mendenhall and Gilbert compared with observations made in 1909 show that there has been no

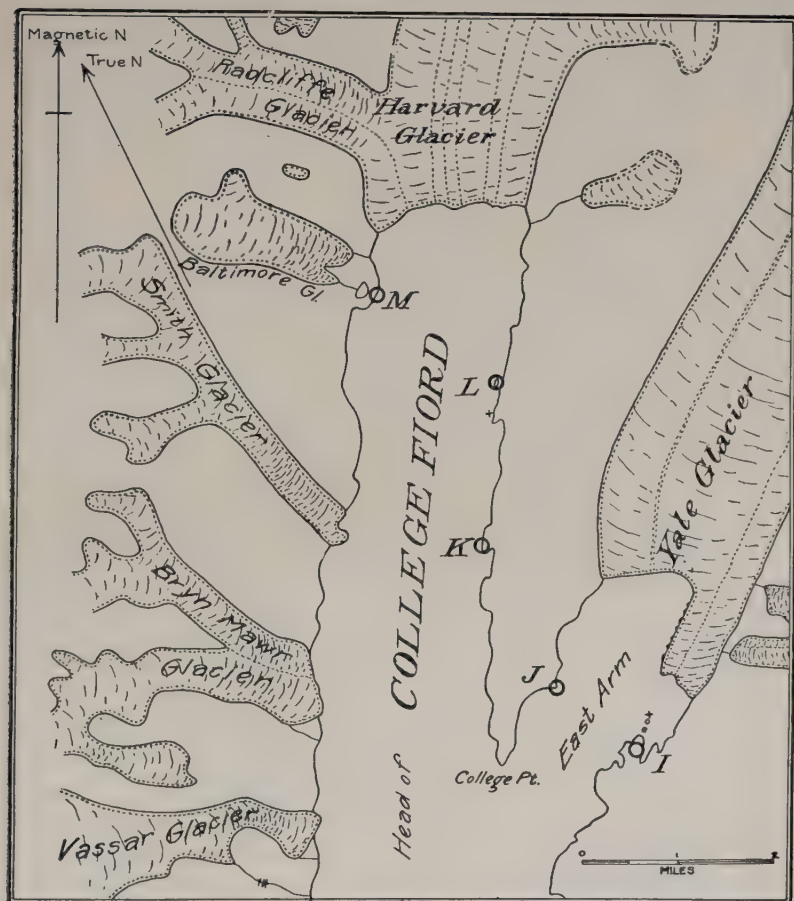


FIG. 2.—Map of the head of College Fiord, July, 1909. The points marked by circles are stations from which photographs were taken.

marked advance at the edges of the ice front since 1898, but the eastern side of the glacier was slightly farther advanced in the later year. Gilbert says, "The trough in which it [the glacier] lies is forested along the water edge on both sides for the greater part of the distance from the main fiord to the glacier, but barren in the immediate vicinity of the glacier. There are straggling trees high on the valley wall at the end of the glacier, but they do not come down close to the ice." This was the condition of affairs at the time of

our visit in 1909, excepting that there was a very narrow bare zone on each side of the glacier. On the east side the ice is separated from grass and alders by but a few rods of rock *débris*. Possibly these narrow bare areas are due to no more than the rapid melting away of the ice in the summer. Although the sides of the fiord are barren of trees they are clothed with a tangle of salmonberry bushes and alders up to the line where the scattering timber begins. This line is very distinct on each side of the fiord. It is practically horizontal at an elevation of 900 feet (estimated) and probably marks the lateral margin of the great ice stream which once occupied the entire fiord.

The published maps show the front of the glacier as approximately straight, but intersections on the front in 1909 showed that the east part of the glacier projects farther than the west part. The former portion is held in place by a hard ledge of rock extending about parallel with the axis of the glacier. Figures 2 and 4 show this feature of the front as well as portions of the rock peeping out from under the ice cliff. This ledge shows distinctly in a photograph by Curtis in 1899. The tiny islands in the foreground are gull rookeries and belong to the same hard rock layers. The station from which this view was taken is on a glaciated knob of the same resistant formation. Careful examination of the Harriman Expedition photographs shows that the ice front was then probably as now. The irregular shape may have been overlooked in a rather cursory survey, for we have noticed that in a perspective view ice fronts are very deceiving and that a seemingly straight wall of ice often shows very unexpected variations when more closely examined.

The growth of a mature alder thicket close down to the ice indicates that the glacier front is now close to its maximum advance in a period of perhaps 50 or more years. The gravelly point a mile below the glacier on the east side of the fiord is probably the remains of an older terminal (recessional) moraine. This moraine, however, is younger than the time of greater ice extension indicated by the lower limit of the spruce forest about 900 feet above sea level.

HARVARD GLACIER

The Harvard Glacier is the trunk glacier of College Fiord and is the largest and most impressive of that inlet. The glacier has several feeders and 6 distinct medial moraines, as well as other less distinct drift accumulations on its surface. The frontal cliff is estimated to be 350 feet in height and at the times of our visits was discharging abundantly, the water down as far as College Point car-

rying much ice. Waves generated by the fall of icebergs and the strong currents in front of the glacier make it impracticable to approach near the glacial front in a small boat. Reports are current that the native seal hunters in bidarkas have been drawn under the glacier by northward flowing currents. At the time of our visit in 1909 there were marked northward-flowing currents on both sides of the fiord near its upper end. The head of the Harvard Glacier is in lofty mountains far back from the glacial front. The most distant of these mountains were roughly estimated, by intersection of small angles, to be about sixty miles from the frontal cliff of the glacier.

The Harvard Glacier was visited by the Harriman Alaska Expedition in 1899.* We saw and photographed the glacier at a distance in 1905 and at close range in 1909. Gilbert's description of the Harvard Glacier calls attention to the relation of this to the southernmost feeder on the west, the Radcliffe Glacier, and notes that the two barely coalesced in 1899 and that the medial moraine of the feeder extended without curvature to the frontal cliff. A photograph taken in 1905 shows that practically the same conditions prevailed at that date. In 1909, however, this medial moraine was distinctly curved (as Gilbert predicted, should the glaciers advance) and it followed the general axis of the trunk stream for half a mile before reaching tide water (Fig. 5.) Thus the position of the west side of the front of the Harvard Glacier was approximately the same in 1899 and 1905, but there was an advance previous to July 1, 1909, at which time the ice front is estimated to have been half a mile farther south than on the earlier dates.

Gilbert reports, from a study of photographs, that in 1899 the eastern side of the front of the Harvard Glacier was 1,000 to 2,000 feet north of the apex of an alluvial fan made by a stream from a small hanging glacier. A photograph taken 10 years later, compared with his statements and photograph,† indicates that in 1909 the eastern side of the glacial front was farther advanced than in 1899, roughly estimated at a quarter of a mile.

BRYN MAWR GLACIER

On the west side of College Fiord is a series of beautiful small glaciers (Figures 1 and 2) which fed the great ice stream which once occupied the whole fiord. Four of these,—the Smith, Bryn Mawr, Vassar, and Wellesley glaciers,—now reach tide water,

* Harriman Alaska Expedition, vol. 3, 1904, pp. 84, 86, 89.

† Harriman Alaska Expedition, vol. 1, 1901, pl. facing p. 72.

while the others end high up on the rocky wall of the fiord. The Bryn Mawr Glacier is the largest and the most attractive of those on the west side of College Fiord. It is a veritable ice cascade, and the impression of a rushing torrent is ever present to one who views the glacier from directly in front and at short range (Fig. 6). The glacier is formed by two trunk streams which unite about a mile back from tide water. The two streams flow in a deep valley of fairly gentle slope, but just before joining they plunge over a steep slope. Below this the glacier has a gentle gradient for about half a mile and then another and still more tumultuous fall leads nearly to tide water, before reaching which the glacial profile flattens again



FIG. 3.—East side of front of Yale Glacier from Point I (Fig. 2), July 1, 1909. This photograph and Fig. 4 were taken from the same point and together form a panorama of the Yale Glacier.

on the floor of College Fiord. Below the crest of the upper fall the glacier lies in a very shallow trough. The crests of these ice falls are thought to represent the approximate upper limits of the trunk glacier of College Fiord at two earlier stages in its history; and the Bryn Mawr Glacier of today occupies a hanging valley on the side of this fiord. Similar characters are shown by other glaciers of College Fiord and their significance has been noted by Gilbert.*

A comparison of the photographs taken in 1899† with those taken in 1909 indicates that the glacier was farther advanced at the latter date and that its front (especially the southern half of the front) deployed more widely on the shallow bottom of College

* Harriman Alaska Expedition, vol. 3, 1904, pp. 86-88, 175-6.

† See also Harriman Alaska Expedition, vol. 2, p. 276, and vol. 3, frontispiece.

Fiord. A photograph taken in 1905 (Fig. 6) and an impression gained four years later indicate that the glacier was less advanced at the earlier date, and that it was then (1905) at approximately the same position as in 1899. Any close estimate of the actual amount of this advance (as recorded in the photographs taken in 1909) is impracticable from the data at hand, but it is probably as much as 500 feet.

HARRIMAN FIORD

The first recorded visit to Harriman Fiord was made by the Harriman Alaska Expedition in 1899 and the main glaciers were named by the members of that expedition. (See Fig. 7.) Previous



FIG. 4—West side of front of Yale Glacier from Point I (Fig. 2), July 1, 1909. Point I is a small round rock knob, rising 30 to 40 feet above the water; this knob is part of a resistant stratum which forms the small point in the right-hand foreground of the photograph and also the small rock masses just projecting from under the front of the glacier.

to that date the Barry Glacier, lying at the sharp bend in the fiord, was the only one which had been recorded, and earlier explorers evidently assumed that this ice stream filled the whole end of this arm of Port Wells. That this glacier has not, however, extended across the fiord for a long series of years is shown by the vegetation, including a sparse forest, coming down nearly to the water's edge opposite this glacier; and by well authenticated reports that native seal hunters had repeatedly gone past the front of the Barry Glacier and into the inner part of the fiord. To the Harriman Expedition is, however, due the credit of bringing to public knowledge this magnificent fiord hemmed in by lofty mountains whose sides

and valleys carry many glaciers. Five of these ice streams reach tide water.

Of the points of scenic interest in Alaska, as far as the glaciers are concerned, three stand out prominently—Glacier Bay, the Yakutat-Disenchantment Bay region, and Harriman Fiord. The panorama of mountain, ice, snow, and water which unfolds itself from points along the southeastern shore of Harriman Fiord has few equals anywhere in the world.

The most striking peaks about the fiord are Mt. Gilbert on the north and a four-peaked summit, Mt. Muir, on the west of the Serpentine Glacier. A rough estimate, made by vertical angles, of the



FIG. 5—Western part of front of Harvard Glacier, showing its southernmost feeder (the Radcliffe Glacier). The photograph was taken from Point L (Fig. 2), on July 1, 1909. The western medial moraine of the Harvard Glacier is the continuation of the medial moraine of the Radcliffe Glacier.

altitudes of these gave results approximating 10,000 feet in each case. These peaks are named after Grove Karl Gilbert, geologist on the U. S. Geological Survey, and John Muir, the veteran naturalist, both of whom were among the first scientists to see Harriman Fiord.

The records of the fluctuations of the glaciers in Harriman Fiord are unfortunately fragmentary. Gilbert's descriptions are mainly from a study of photographs and the accounts of others.* Our photographs taken in 1905 were few, and in 1908 time permitted only a hurried view of the Barry Glacier. In 1909 a little more

* *Op. cit.*, pp. 89-97.

time was spent in Harriman Fiord, but very much less than the locality deserves. Sufficient data are at hand, however, to show that the Barry and the Surprise glaciers have retreated markedly in the last 10 years, while the Serpentine, Cataract, Harriman, and Toboggan glaciers have shown much less change in that time.

BARRY GLACIER

The Barry Glacier is in some ways the most interesting in Harriman Fiord and there is a more complete record of its fluctuations



FIG. 6.—Bryn Mawr Glacier, Aug. 21, 1905.

than of any other in Port Wells. In 1899 the front of the glacier was well out into the waters of Harriman Fiord, and ten years later this glacier showed a much greater retreat than any other of the glaciers we have studied. From 1899 to 1909 the Barry Glacier retreated a distance of approximately 2.1 miles measured along the axis of the glacier (Fig. 7). From 1899 to 1905 the retreat was 1.2 miles; from 1905 to 1908, .4 mile; and from Aug. 11, 1908, to June 29, 1909, .5 mile. In 1899 there was a long point of ice extending

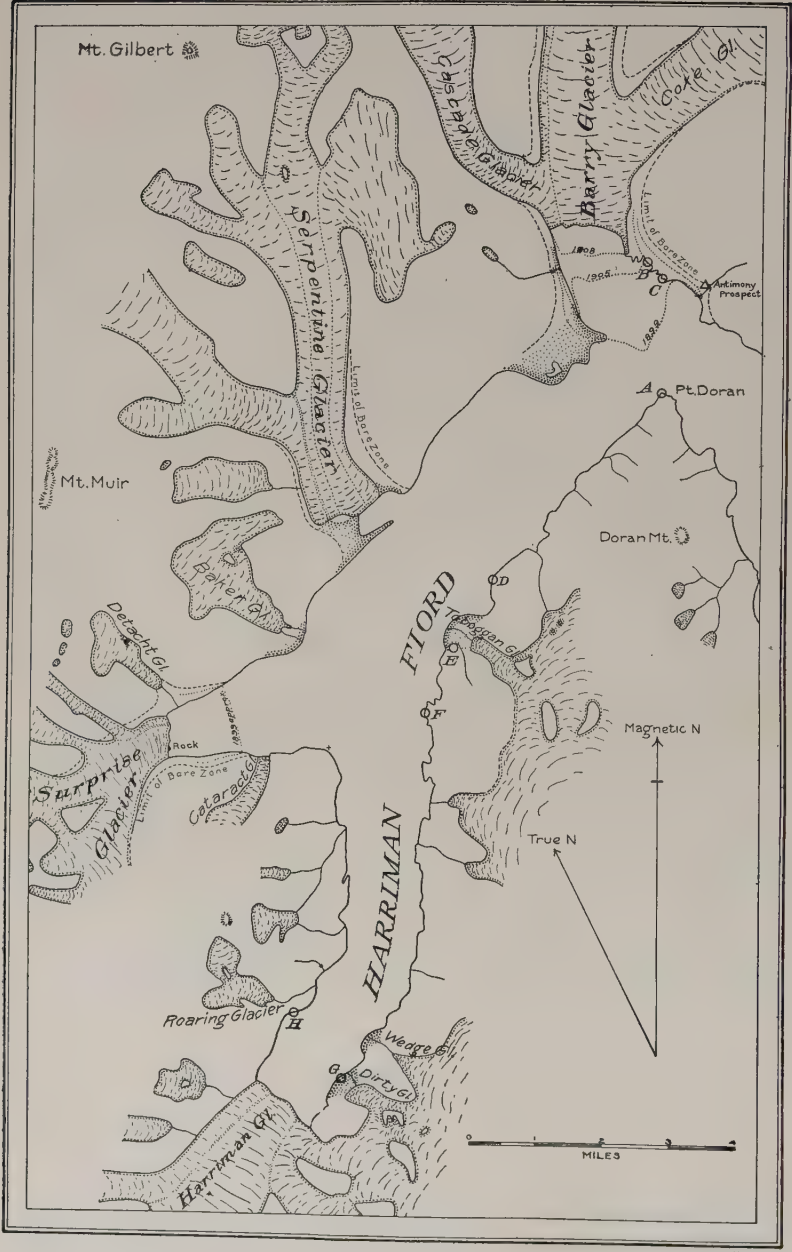


FIG. 7.—Map of the upper part of Harriman Fjord, June 29 and 30, 1909. The points marked by circles are stations from which photographs were taken.

forward from the east side of the glacial front; in 1905 there was a similar one from the west side; and in 1909 a shorter one extended forward from the east side. The two earlier points of ice were probably in the main unmelted stagnant portions of the glacier resting mostly above tide level, but the 1909 projection was part of the moving glacier.

Along both sides of the Barry Glacier there is an extensive bare zone between the ice and a mature spruce forest. (Part of this bare zone is shown in Fig. 8.) Near the antimony prospect southeast of the glacier there are fragments of trees in the drift, and near the southern limit of the bare zone at this locality are a number of

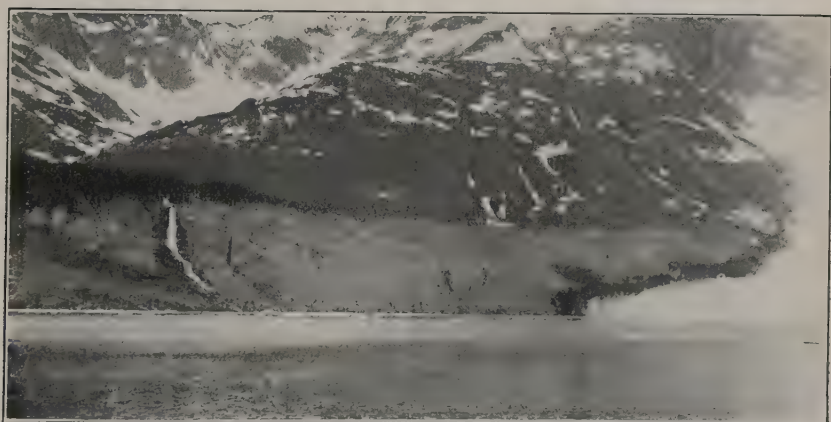


FIG. 8.—Western side of trough of the Barry Glacier from Point C (Fig. 7), June 29, 1909. The western part of the front of the glacier is shown on the right; and on the left is a waterfall in a stream which comes from a hanging valley in which is a small glacier. In 1899 the front of the glacier was a mile and a half beyond (to the left of) this waterfall; in 1905 a quarter of a mile beyond; in 1908 about half way between the waterfall and the present position of the glacial front.

fallen trunks. The limit of this bare zone marks the maximum advance of the ice since the growth of the present forest. The ice probably stood near this point of maximum advance for some time during which was deposited the morainic accumulations on the west side of the bay in which is the glacier. No definite data establishing the date of the end of this maximum advance are available, but the condition of the forest above the bare zone and the vegetation on the morainic deposits just mentioned would indicate that such a maximum occurred some years ago, probably 25 or more. Still more advanced positions of the ice front have not occurred for probably a few centuries. The glacier had retreated from this maximum position when it was first studied (1899).



FIG. 9.—Serpentine Glacier from Point D (Fig. 7), June 23, 1909. The main part of this glacier lies in the apparently low valley on the right side of the photograph.



FIG 10—Baker and Detacht Glaciers, the latter on the left, from Point F (Fig. 7), June 29, 1900. The highest peaks (Mt. Muir) to the right of the center are approximately 10,000 feet above the sea in the foreground.

The position of the west side of the ice front in 1909 with reference to the first feeder (Cascade Glacier) and the prominent waterfall from the hanging valley near the north end of the forested zone will assist in recording the amount of future fluctuation of this glacier (Fig. 8).

SERPENTINE GLACIER

The Serpentine Glacier is the first to reach tide water west of the Barry Glacier (Figs. 7 and 9.) A considerable bare zone, not covered by vegetation, along the sides of the Serpentine Glacier, and morainic accumulations in front of the glacier are evidences of an advance in comparatively recent years, but previous to 1899. The bare zone on the side is underlain by a considerable lateral moraine deposited at the time of this advance. This glacier had an advance a few years before 1899; in 1905 the position of the front of the ice was approximately the same as in 1899; and in 1909 the ice front was farther back than at either of the other dates. The retreat from 1905 to 1909 is perhaps a quarter of a mile, and from the advance before 1899 to the present the glacier has retreated approximately half a mile on its center and eastern side and three-quarters of a mile on its western side. These distances are to be regarded only as estimates, for we did not study the front of this glacier at close range and most of our information comes from photographs.

BAKER GLACIER

The Baker Glacier is named after Dr. Marcus Baker, editor of the *Geographic Dictionary of Alaska*.^{*} The névé and the ice stream of this glacier are practically one and nearly the whole glacier is shown in Figure 10. The surface of the Baker Glacier has a steep slope but near the sea the ice stream breaks over an almost vertical cliff from which the ice falls and accumulates near tide water. A small tongue of the glacier does, however, pass over this cliff and joins the ice below. These features can be seen in Figure 10, which shows the conditions in 1909. In 1905, however, there was no ice at the base of the cliff, the small tongue of the glacier came downward for only a short distance from the top of the cliff, and the ice front above the cliff was not so high and so prominent as in 1909. The photographs to which we have access, taken in 1899, show that conditions then were very similar to those in 1909, but no front view of the glacier at the earlier date is available.

^{*} *Bull.* U. S. Geol. Survey No. 187, 1902, and No. 299, 1906.

The Baker Glacier then shows a retreat between 1899 and 1905, and in 1909 the ice had advanced to and quite probably beyond its position of ten years earlier. Data are not at hand to measure the amount of this retreat and advance, but the distance is probably only a few hundred feet.

In the study of these glaciers and mountains in the field, and also from photographs in the office, one finds it constantly necessary to enlarge his conceptions of distances and elevations. The glaciers, when seen both in the field and also in photographs, appear to be much shorter and so proportionally wider than they really are, and distant mountains seem to be very close at hand. It is not until one tries to make a plane table map of these glaciers and mountains and



FIG. 11—Surprise Glacier from Point F (Fig. 7), June 29, 1909. Detacht Glacier is on the extreme right of the photograph.

determines, by intersections, their locations and sizes that he gets a reasonably accurate conception of the distances. In the photograph here reproduced as Figure 10, the shore line is two miles, and the highest peaks (Mt. Muir) just to the right of the center are seven miles from the observer and the tops of these peaks are approximately 10,000 feet above the sea in the foreground.

SURPRISE GLACIER

The Surprise Glacier reaches tide-water in a vertical cliff at the head of the west arm of Harriman Fiord. Along both sides of the glacier is a bare zone which extends forward nearly to the Cataract Glacier. Gannett's map of Port Wells* shows the front of the Sur-

* Harriman Alaska Expedition, vol. 3, 1904, pl. 13.

prise Glacier practically at the point where the Cataract Glacier reaches tide-water. Photographs taken that year (1899), however, show that the two glaciers were separated by a distance which is estimated to be a quarter of a mile. In 1909 the front of the Surprise glacier was much farther (estimated at 1.1 mile) back than in 1899. How much of this retreat had taken place since 1905 is not clear, for our photograph of that year is indistinct but it is certain that a considerable part of the retreat had occurred by 1905. A rock ledge, divided into two parts, projected from the front of the glacier near its south side in 1909 (Fig. 11). Evidently this ledge would be covered by a slight advance of the ice, at least so it appeared from opposite the front of the Cataract Glacier, our point of



FIG. 12—Front of Harriman Glacier from Point F (Fig. 7), June 29, 1909.

observation nearest the Surprise Glacier. It is our recollection that no such ledge was visible in 1905.

The maximum advance of the Surprise Glacier in recent years is indicated by the bare zone, and by 1899 the glacier had retreated about a tenth of a mile. This retreat was continued in 1905, and by 1909 the glacier had retreated 1.1 miles from its position in 1899.

HARRIMAN GLACIER

The Harriman is the trunk glacier of Harriman Fiord and comes to tide level at the southwest end of this body of water. The frontal cliff is estimated to be 300 feet in height. The glacier has several feeders and comes from an extensive and unexplored snow field

from which only a few snowless peaks emerge. Even in summer these mountains still retain most of their snow mantle (Fig. 12).

Photographs of the eastern side of the front of the Harriman Glacier taken from Point H (Fig. 7) in 1905 and 1909 show that this side of the glacier retreated approximately 700 feet between these dates. A comparison of an 1899 photograph* with the above indicates that between 1899 and 1905 the east side of the glacier retreated about half the above distance. As the two photographs were not taken from the same point this estimate of the retreat between 1899 and 1905 is only approximate. On the west side of the



FIG. 13—Toboggan Glacier, Aug. 20, 1905. The low mounds in the foreground represent a moraine formed by a very recent advance of the ice when it reached practically to tide water.

ice front a careful examination in 1909 of the glacier from the position of a photograph† taken in 1899 showed no noticeable difference in the position of the glacial front. In 1899 a considerable embayment existed in the eastern third of the front of this glacier, but was not present in 1905 and 1909.

* Harriman Alaska Expedition, vol. 3, 1904, pl. 15, upper figure.

† Idem, pl. 15, lower figure.

TOBOGGAN GLACIER

The Toboggan Glacier is a small ice stream coming from a considerable snow field which lies in the northern part of the peninsula separating Harriman Fiord from the lower part of Port Wells. This glacier has a marked bare zone along its sides and its end deploys on a flat not far above sea level (Fig. 12). We visited this glacier on August 21, 1905, and on June 29, 1909. At the earlier date a small cairn was built on the north end of the first and most northerly projecting rock ridge on the right side of the valley as it is approached from tide-water. In 1905 the center, or most advanced part of the glacier, was 723 feet, as determined by pacing, distant from the cairn, whose location is shown on Figure 7 (Point E). Just at the extreme front of the ice at this date was a low rock ridge crossing the valley. In 1909 the most advanced part of the glacier was 252 feet farther back than in 1905. However, in 1909 a freshly deposited low moraine in the northern half of the plain in front of the glacier indicates that the ice sometime between 1905 and 1909 had been about 400 feet in advance of its position at the earlier date. The map of 1899* shows that the glacier did not reach tide water at that time, but the lack of vegetation on the bare zone at the side of the glacier and on the flat in front of it in 1905 (Fig. 12) shows that the ice front has occupied an advanced position, reaching practically to tide water, at a very recent date, possibly but not probably later than 1899.

* Harriman Alaska Expedition, vol. 3, 1904, pl. 13.

THE ESTABLISHMENT OF MICHIGAN'S BOUNDARIES: A STUDY IN HISTOR- ICAL GEOGRAPHY

BY

GEORGE J. MILLER

A study of the boundaries of most States would reveal many interesting problems in historical geography. In some cases a misconception of the geography of a region led to the confirmation of odd boundaries. In other cases the natural boundary was disregarded. The position of Michigan among the Great Lakes and the importance of lake frontage to adjoining States made the establishment of its boundaries a national affair. They represent a compromise and created in Michigan two economic units having very unlike interests.

TERRITORY OF MICHIGAN ESTABLISHED

By the treaty of Paris in 1783 the United States obtained title to that portion of the Great Lakes region lying south of the Canadian boundary, though it was occupied by the British until 1796. A number of Eastern States promptly advanced claims to large parts of the territory. Yielding to public opinion, however, they soon surrendered these claims to the Confederation, and in 1787 all the land north of the Ohio River and east of the Mississippi was organized as the Northwest Territory. Article 5 of the ordinance provided that "there shall be formed in the said territory not less than three nor more than five States," and defined the boundaries of the three proposed States. The same article provided that "the boundaries of these three States shall be subject so far to be altered, that, if Congress shall hereafter find it expedient, they shall have authority to form one or two States in that part of the said territory which lies north of an east and west line drawn through the southerly bend of Lake Michigan." When any of the said States should be established, the northern boundaries of Ohio, Indiana, and Illinois were to be definitely marked according to the terms of the ordinance.

By an Act of Congress in 1805 the territory of Michigan was defined more definitely on the west by "a line drawn from the said southerly bend (of Lake Michigan) through the middle of said lake to its northern extremity (Fig. 1), and thence due north to the northern boundary of the United States."* The southern boundary remained as defined in the ordinance, and the Territorial Government was established with these as boundaries.



FIG. 1.—Territory over which the jurisdiction of Michigan has extended—1805, 1818, 1834.
Mich. Pioneer and Hist. Soc. Coll., Vol. 27, p. 348.

OHIO AND INDIANA SOUGHT MICHIGAN TERRITORY TO GAIN LAKE PORTS

Michigan's history within definite limits begins here. The territory soon was involved in a serious struggle to maintain the integrity of its domain, as both Indiana and Ohio sought valuable portions. The division of the territory was based on Mitchell's map of 1775 (Fig. 2), which set forth the best-known information of the geography of the region. According to this map, a due east and west line through the southern bend of Lake Michigan intersected the in-

* Sen. Doc. 211, p. 20, 24th Cong., 1st. Sess., Vol. 3.

ternational line north of Lake Erie, giving the ports of that lake to the area which became Ohio, and deprived both Indiana and Illinois of a lake port. A later map of the region (Fig. 3) brought out the fact that Toledo and Monroe Harbors belonged to Michigan.

The Harbor of Monroe was of small importance compared with that of Toledo, and Ohio people supposed that the latter fell within

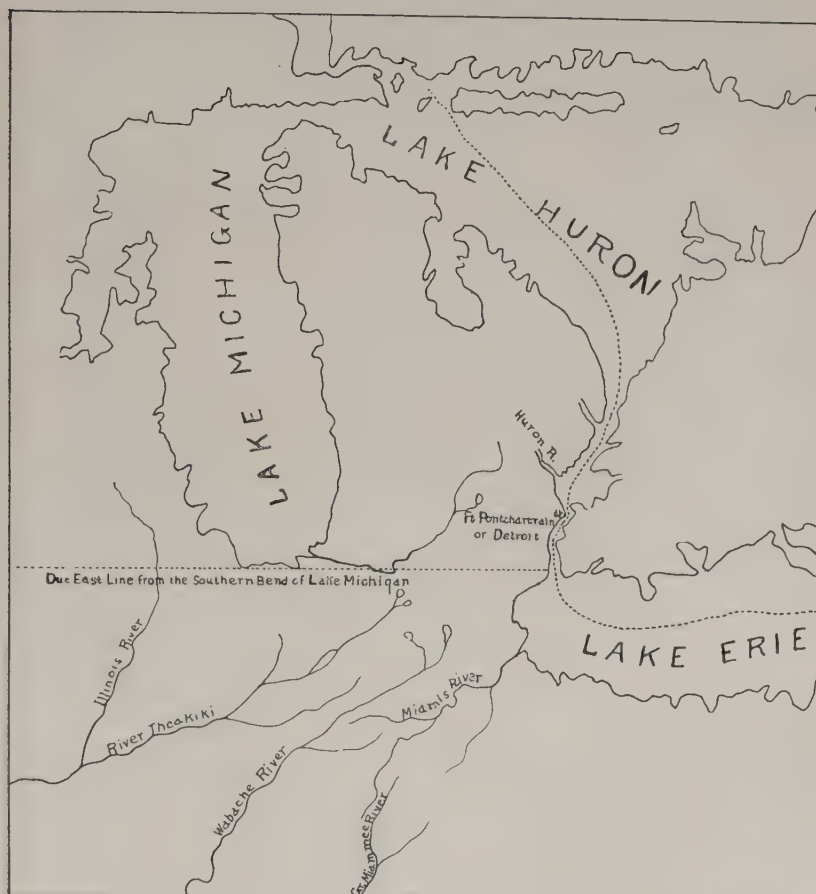


FIG. 2.—Mitchell's Map of 1755. Sen. Doc. 211, p. 16, 24th Cong., 1st Sess., Vol. 3.

their limits. This was reported not to be the case when the convention was in session to form their State constitution.* Realizing that they would lose practically their entire lake front if the southern bend of Lake Michigan lay as far south as reported, they inserted a

* Historical Transactions of Ohio, Vol. 1, pp. 77, 116.

clause in their constitution defining their northern boundary as a line running from the southern bend of Lake Michigan to the northern point of Maumee Bay* (Fig. 3). This was to be the boundary if the report was true, and Congress assented. Congress accepted the constitution proposed for Ohio, and admitted the State to the Union, but did not give its formal consent to the boundary.† Ohio, however, claimed the area thus shorn from Michigan and attempted to govern it.

When Indiana presented itself for admission, Congress consented to the shifting of Michigan's southern boundary ten miles north of the southern bend of the lake,‡ thus taking from it another port and giving it to Indiana. This port was of vital importance to Indiana as it afforded water transportation at the north in addition to its facilities at the south.

Michigan gave little attention at the time to the Indiana matter other than to protest the precedent,§ as the area was unsettled. Such was not the condition, however, in the southeast about Toledo. The active settlement of Michigan began from the vicinity of Maumee Bay and Detroit, and nearly all the population was still in that quarter. The leading commercial interests of the territory centered there, and when Ohio asked for admission, Wayne County, which then included all the southeastern part of the State, protested vigorously against being left out. They felt that their business interests would be served better by the State government, than they could be if left within a territory.|| The leading men of Michigan, however, had its future somewhat planned, and fortunately their counsel prevailed in Congress, and Wayne County remained a part of the territory.

Michigan had commercial interests at stake. A railroad had been started which was to terminate at Toledo, and to transfer this port to another State was to Michigan unreasonable and illegal. The men most interested aroused the spirit of State patriotism until the people were ready to fight for the strip which had, thus far, belonged to them.

Ohio claimed that Toledo was the "key" to the west and must

* Constitution of Ohio, Article 7, Sec. 6.

† *Sen. Doc.* 354, pp. 13-18, 23rd Cong., 1st Sess., Vol. 4.

‡ *State Papers*, No. 3, p. 30, 14th Cong., 2nd Sess.

Sen. Jour. 14th Cong., 2nd Sess., pp. 27-28.

§ *Memorial* of the Governor and Judges, 1818, Archives of State Dept., of Mich. Cited by A. M. Soule: *Pub. Mich. Pioneer and Hist. Soc.*, Vol. 27, p. 342.

Sen. Jour., 15th Cong., 1st Sess., p. 180.

|| *Statutes of Ohio*, Vol. 3, p. 2096.

St. Clair Papers, Vol. I, pp. 228-229; Vol. II, pp. 543-580.

Burnet: *Notes on the Early Settlement of the Northwest Territory*, pp. 337-494.

be included within its boundaries. This, of course, was an equally strong reason why Michigan should not surrender it. Congress had for years given aid to internal improvements in Ohio. One of the greatest of these projects was the Wabash and Erie Canal (Fig. 3).

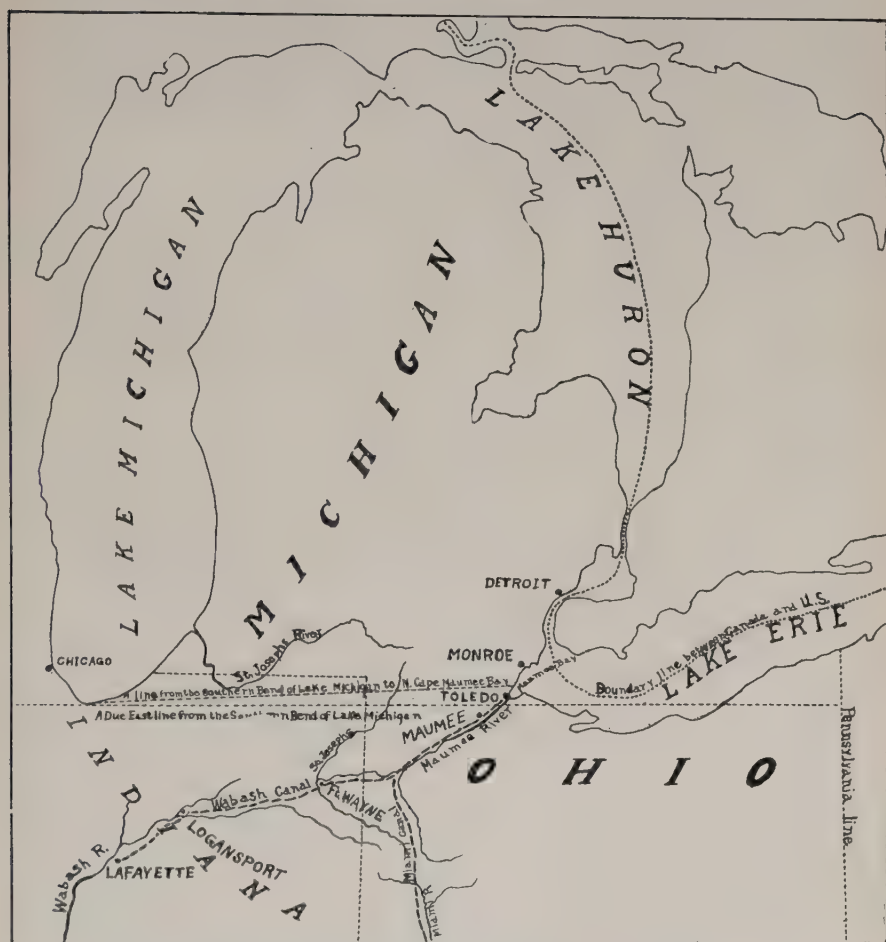


FIG. 3—Relative position of Lake Erie and Michigan. From Sen. Doc. 211, p. 16, 24th Cong., 1st Sess., Vol. 3.

It was now pointed out that this canal would terminate in Michigan unless the claims of Ohio were maintained.

The importance of Toledo in the minds of the business men of the day may be summarized as follows: (1) It had a good harbor. The estuary of the Maumee River formed a harbor that, for the relatively small boats of the day, was thirteen miles long and had

a navigable channel about 100 rods in width.* (2) It was held to be the nearest port for an area as large as Massachusetts and Connecticut combined, and with more than double their producing capacity of food and raw materials.† (3) Most of the people of Michigan and of Upper Canada passed through it in their intercourse with Ohio, Pennsylvania, and Virginia.‡ (4) It was nearer than any other town on Lake Erie to the gathering point of northwestern commerce—the southern bend of Lake Michigan.‡ (5) It was nearer than any other lake town to Cincinnati the chief city of the Ohio valley.‡ (6) A proposed canal system was to center at Toledo. This system was to be 663 miles long and to pass through a rich region.‡ (7) It would be an important distributing point for the manufactures of the East and Europe. The canals would give it a hinterland of 100,000 square miles.§ (8) Water power would be supplied from the canals, and coal could be obtained cheaply.||

TOLEDO HARBOR, STATEHOOD, AND NATIONAL POLITICS

Michigan asked admission in 1833 with the original boundaries (1805) of the territory. But the settlement of the northern boundary of Ohio and Michigan's admission were inseparable questions, and statehood was denied. When the second attempt to gain statehood failed, Michigan decided to form a constitution and State government without permission. This was done in 1835 along the lines of the Ordinance of 1787 and Michigan actually exercised for about two years, until admitted, all the prerogatives of a State.** During that time the dispute with Ohio waxed warm, both sides being thoroughly determined to gain their point. Michigan exercised jurisdiction over the disputed tract, while Ohio pressed its claims. Troops were sent to the scene by both sides and a disastrous border war was narrowly averted.

Justice and precedent appeared to favor Michigan, but expediency lay on the other side. The ownership of the Lake Erie port now affected national politics and finally was settled on the floor of Congress. Three States and a Territory were drawn into the struggle. By the opinion of the attorney general it was the duty of the President to support Michigan at all hazards, but the latter's in-

* *Hunt's Merchants' Magazine*, Vol. 9, p. 42.

† *Hunt's Merchants' Magazine*, Vol. 17, p. 490.

‡ *Ibid.*

§ *Ibid.*, Fol. 9, p. 46.

|| *Ibid.*, p. 44.

** T. M. Cooley: *Michigan*, pp. 219-220.

terests were on the side of Ohio.* A presidential election was at hand and to support Michigan was to lose Ohio to his party. As a great State it might hold the balance of power in the election. Michigan was democratic and would strengthen the President's party. But Indiana and Illinois, both of which had secured their boundaries in violation of the Ordinance of 1787, were interested adversely to its boundary claims.* Here were three States with votes in the Electoral College on one side, and a non-voting Territory on the other. They would probably be alienated if the President decided against them. If Michigan were admitted before election its votes could not equal those of the three opposing States.* Well might John Quincy Adams say: "Never in the course of my life have I known a controversy of which all the right was so clear on one side and all the power so overwhelmingly on the other, never a case where the temptation was so intense to take the strongest side and the duty of taking the weakest was so thankless."†

Political interests finally prevailed and, as a compromise, the Upper Peninsula and Statehood were offered to Michigan if it would accept the present northern boundary of Ohio. A convention for this purpose was called at Ann Arbor in September, 1836. In the meantime considerable sentiment in favor of acceptance had arisen in the more densely settled and commercial southeastern part of Michigan. It was here that industries, agriculture, shipping interests and financial enterprise were feeling the need of a stable state government even if a valuable harbor must be forfeited. It was the same spirit that desired to give Wayne County to Ohio when the latter State was admitted. It is also probable that the proposed plan of distributing the surplus public money had much to do in determining the attitude of the financiers. But, in general, the frontier population was as determined as ever to fight against an infringement of its rights. Practically all the newspapers of the frontier counties earnestly opposed the surrender of Toledo Harbor and the narrow strip of territory involved.‡ To them it was a matter of justice and right. Their counsel dominated the convention and the proposal of Congress was rejected, thus leaving the controversy as far as ever from settlement.§

But the presidential election was drawing nearer and there was an increasing desire to take part in it. There was also a growing sentiment that nothing could be gained by delay. Accordingly an-

* W. Buel: *Mag. Western Hist.*, Vol. III, p. 457.

† Cited by Cooley: *Michigan*, p. 219.

‡ A. M. Soule: *Pub. Mich. Pioneer and Hist. Soc.*, Vol. 27, p. 370.

§ *Journal of the Convention*, pp. 19-27 *et seq.*

other and wholly illegal convention was called by individuals. Resolutions accepting the terms of Congress were passed. These were forwarded to Congress and accepted by it as representing the decision of Michigan.* Ohio therefore won its harbor after involving the nation in the struggle, and Michigan won statehood and the Upper Peninsula.

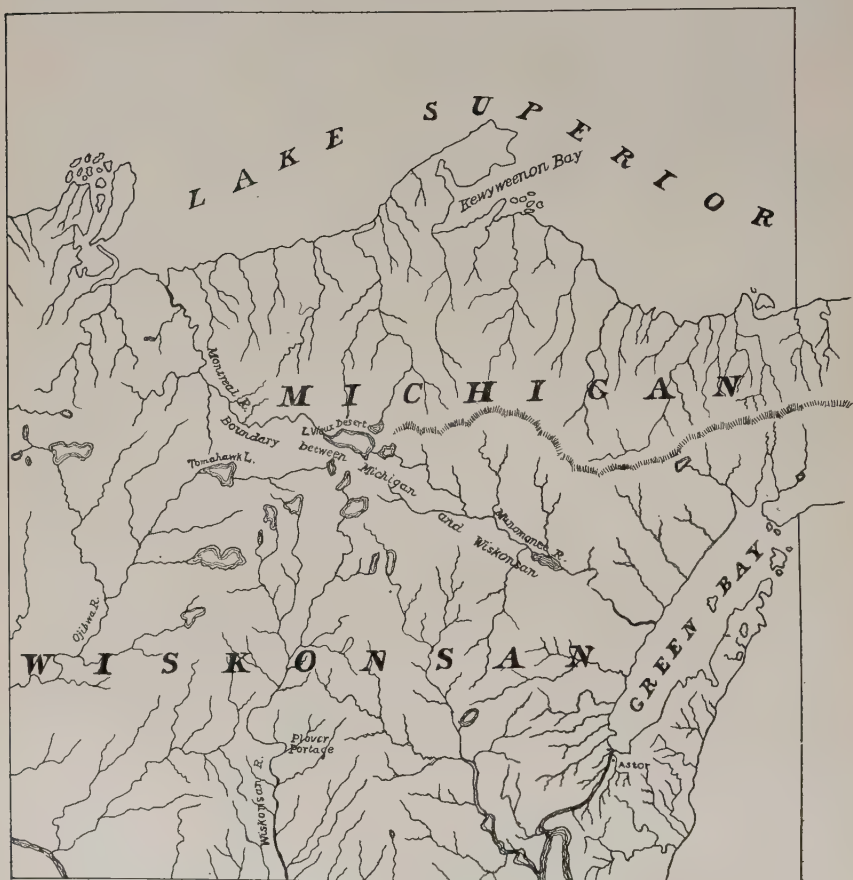


FIG. 4—Supposed boundary between Michigan and Wisconsin, 1838. Sen. Doc. 151, p. 16, 26th Cong., 2nd Sess., Vol. 4.

GEOGRAPHIC CONDITIONS LED NORTHERN MICHIGAN TO SEEK UNION WITH WISCONSIN

The settlement of the northwest boundary played a less important yet an interesting part in Michigan history. The Territory of Michigan, as has been said, was created in 1805, east of a line running

* T. M. Cooley: Michigan, pp. 223-224.

north from the southern bend of Lake Michigan to the Canadian line (Fig. 1). In 1818, all the country east of the Mississippi and north of Illinois and Indiana was added for temporary purposes of government. This was a vast area to be governed from Detroit as a center. The distance and the difficulties of travel were so great that it was practically impossible for the representatives of this region to participate in the legislative councils.* The distance likewise made the exercise of government slow, if not impossible.† The region was being settled rapidly, and soon there was complaint of the great evils resulting from so distant a seat of government.

In 1824, the people west of Lake Michigan petitioned Congress for separate organization. They were joined in their petition by the people north of Mackinac Straits,‡ who felt that their interests were tied up with the western people rather than with the people of Lower Michigan. The Straits formed an impassable barrier between the two peninsulas for a part of every year and seemed to alienate them,§ as it still does to a limited extent. With this petition began the struggle for the Upper Peninsula. The statesmen of Michigan were willing, if not desirous of being rid of the western country on account of its distance and the consequent expense of government, but they objected to the loss of the country north of the Straits and petitioned Congress accordingly. Both petitions were referred by that body and nothing more was heard of it for two years. The desires of these western people for separation from a seat of government so far away grew in intensity as time passed, and, in 1826, "the inhabitants of the northwest part of the Territory of Michigan" again asked Congress to separate them from Michigan proper and allow them self government.** Influences were again brought to bear that caused this to fail.

At the session of the Michigan Legislative Council in 1829 a memorial was presented from the discontented upper counties praying to be annexed to the proposed Territory of Wisconsin. The Council accepted this memorial by a vote of seven to six. Wiser counsel soon prevailed and a few days later it was reconsidered, recommitted and not again reported.†† Constant efforts were directed thereafter against the loss of any of the Upper Peninsula. Yet it is interesting to note that the ties binding the upper counties

* Reports of Committees, No. 56, 21st Congress, 1st Sess., Vol. I, pp. 11-12.

† Wis. Hist. Soc. Coll., Vol. XI, p. 463.

‡ Sen. Jour., 18th Cong., 2nd Sess., p. 68.

§ Wis. Hist. Soc. Coll., Vol. XI, p. 472.

|| Ibid., Vol. IV., p. 353.

** Report of Committees, No. 56, pp. 1-7, 21st Cong., 1st Sess., Vol. I.

†† Jour. of Mich. Legislative Council, 1829, p. 81.

to "The Peninsula"* were so weak, and the knowledge of the resources of these counties so slight that even Governor Cass in his message of 1829 said that he was "not aware that" the creation of a new territory "can injuriously affect our interests."† He seems to have changed his mind shortly after, as in his message of two years later he stated that any division of the territory would be "equally injurious to our rights and subversive of our interests."

The people of the upper counties persisted in their efforts for separation, and continued to memorialize Congress. But that body was busy trying to please Ohio and at the same time satisfy Michigan by extending its territory to the northwest in lieu of the Toledo strip. "The Peninsula" was equally energetic in its attempt to secure statehood. The Constitutional Convention of 1835 brought out and emphasized anew the strong feeling in favor of separation still existing among the northern counties. Four members made an earnest effort to insert the proviso in the constitution; "That nothing therein contained shall prevent the Legislature . . . from consenting to any such alteration of the western boundary line of said State by which the islands of Michilimackinac and Bois Blanc and the County of Chippewa may be detached from the State and attached to the district of country lying west of Lake Michigan. . . ."‡

Michigan's leaders gave little attention to the desires of the people at the north. They began to realize that Ohio was going to win, and Lucius Lyon wrote that it had been decided to "go in for all the country Congress will give us west of the lakes,"§ for, "if we lose on the south, and gain nothing on the north and west we shall be poor indeed."|| He knew that the fisheries were excellent, believed the soil fertile, and had great hopes that the copper deposits would prove valuable. We have already seen that his advice and plans were ultimately accepted, but not before the people of the State had made great protest against forcing upon them "barren wastes" in a region of "perpetual snow."

SUPPOSED WATERWAY PROPOSED AS THE WISCONSIN-MICHIGAN BOUNDARY

A continuous waterway was supposed to exist between Green Bay and Lake Superior (Fig. 4), and Representative Preston pro-

* Name applied to Lower Michigan at the time.

† *Jour. of Mich. Legislative Council*, 1829, p. 5.

‡ *Journal of Constitutional Convention of 1835*, pp. 204-205; for names of members pp. 2, 22.

§ Letter of Lucius Lyon to Col. D. Goodwin, Feb. 4, 1836, *Pub. Mich. Pioneer and Hist. Soc.*, Vol. 27, p. 475.

|| Letter of Lyon to Col. Andrew Mack, Feb. 21, 1836, *Pub. Mich. Pioneer and Hist. Soc.*, Vol. 27, p. 479.

posed to Congress that this be taken as the boundary. The proposal was accepted and surveyors sent to mark the line. They were, of course, unable to do this, and reported the same to Congress.

In the meantime, since the proposed line was impossible, the Wisconsin people seized the opportunity to again enter their protest

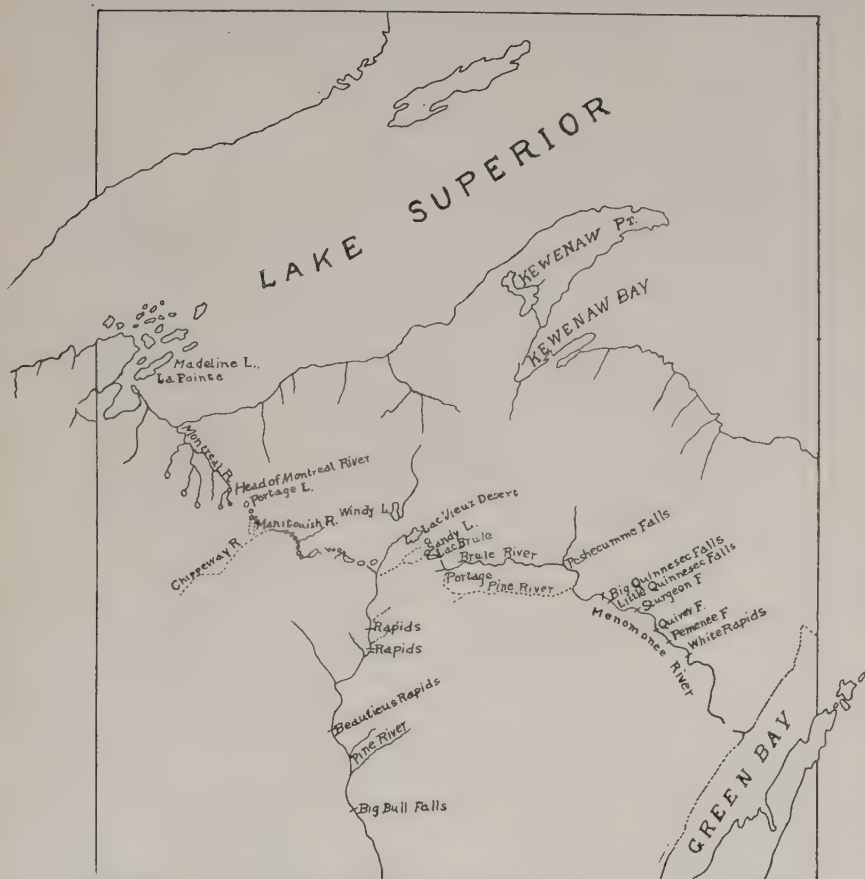


FIG. 5.—Boundary between Michigan and Wisconsin, as corrected by Capt. T. J. Cram, 1842.
From Sen. Doc. 170, p. 12, 27th Cong., 2nd Sess., Vol. 3.

against the loss of the northern counties.* The petition was buried in committee; and thereby aroused all the strong feelings of state rights within the westerners. State sovereignty was discussed in all its phases and serious trouble seemed imminent.† They did not expect that Michigan would yield territory already given it, even

* *Exc. Doc. 147*, pp. 1-7, 27th Cong., 2nd Sess., Vol. III.

† *Wis. Hist. Soc. Coll.*, Vol. II, p. 462.

though the people of the northern counties so desired, but demanded that Congress should pay Wisconsin for the country thus taken from it. This demand met the same fate as the others,* but very likely had much to do with future appropriations favorable to the State. So much space is given here to Wisconsin history in order to emphasize the far reaching effects of Michigan's struggles resulting from her geographic location and economic interests.†

Even today Michigan's northwestern boundary is not satisfactory. The Brule and Menominee Rivers were found by the surveyor to contain many islands, while the "main channels" of the streams were difficult to locate.‡ Congress therefore accepted his advice and divided the islands between the two States, giving those above Quinnesec Falls to Michigan, and those below to Wisconsin§ (Fig. 5). This would seem sufficient, but the main channel at Menominee which is the legal boundary line, lies on the Wisconsin side of the islands which the enabling act gave to that State, thus causing Wisconsin to exercise jurisdiction over islands that are in Michigan.

UPPER AND LOWER MICHIGAN NOT GEOGRAPHIC UNITS

The economic interests of the two peninsulas of Michigan are in striking contrast. The dominant industry of the north is iron and copper mining. Lumbering stands second, while agriculture and manufacturing (other than copper smelting) are of relatively small importance. The two peninsulas are separated by the Lake Michigan-Huron waterway, which is blocked by ice for part of the year. Much of their intercourse therefore takes the route through Wisconsin and Chicago. This leads to more economical trade relations with Wisconsin by the people of the north. The great bulk of their lumber and mine products finds markets outside of Michigan, thus offering little inducement for trade between the two sections. The Southern Peninsula is dominantly agricultural and manufacturing. Its lumbering and mineral resources are also of another sort, being soft woods (largely), coal, and salt. The principal outside markets for its products are found to the west, south, and east rather than in the Upper Peninsula. This means that the two sections are not a geographic and economic unit, and it leads to the differentiation of the interests of the people.

The old feeling of attachment in the Upper Peninsula to the

* A. H. Sanford: *State Sovereignty in Wisconsin*, in *Pub. Am. Hist. Assoc.*, 1891, p. 177 et seq.

† *House Journal*, 28th Cong., 1st Sess., pp. 483, 740.

‡ Sen. Doc. 151, pp. 7-9, 26th Cong., 2nd Sess., Vol. IV.

§ Statutes at Large, Vol. IX, p. 57.

country at the west, and the lack of strong ties binding it to the Lower Peninsula are still apparent. The separation produced by the lakes has been intensified by the building of interstate railroads. They furnish good communication with Wisconsin and other western States. Here no barrier exists, and the economic and social interests on both sides of the line are identical. The effort to court the favor of the Upper Peninsula has always been a factor in Michigan politics. It was the long established custom of the political parties to give it the office of Lieutenant Governor and the certainty of losing this in case "Primary Reform" was adopted led to much discussion if not to serious opposition to it in that section. As was foreseen its adoption took this office from the Upper Peninsula. A substitute had to be secured in order to avoid serious disaffection, and that substitute was found in the office of Superintendent of Public Instruction. This illustrates the human response to geographic and economic environment. The activities of a government may be extended over an area within boundary lines arbitrarily drawn, but the establishment of those lines does not make a united people. Few States of the Union are economic units hence their government is a compromise of diverse interests.

THE HEMPSTEAD PLAINS A NATURAL PRAIRIE ON LONG ISLAND

BY

ROLAND M. HARPER

It does not seem to be generally known, even to geographers, that there is in the western third of Long Island, within an hour's journey by rail from New York, about fifty square miles of dry land which was treeless when the country was first settled, and that a considerable part of this can still be seen in its natural condition. This prairie, known locally as the "Hempstead Plains," is mentioned in a few historical and descriptive works, but long before geography became a science it had ceased to excite the wonder of the inhabitants and travelers, few of whom at the present time realize that there is not another place exactly like it in the world. Its influence on local geographical nomenclature is shown in the names Plainview, Plain Edge, Island Trees and East Meadow Brook.

The earliest description of this geographical curiosity which I have heard of occurs on page 241 of "A Tour in the United States of America," by J. F. D. Smyth, Esq., published in Dublin in 1784. There are several interesting references to it in the two editions of B. F. Thompson's History of Long Island, published in 1839 and 1843, especially the second. My attention was first called to it by the following statement in the U. S. Department of Agriculture's "Soil survey of the Long Island area," by J. A. Bonsteel and others:—* "The . . . Hempstead plain is notable in being a natural prairie east of the Allegheny Mountains. In its natural state it bears a rank growth of sedge grass. It was treeless when first discovered and was originally used as commons for the pasturage of cattle and horses belonging to individuals and to communities."



FIG. 1.—Looking east across dry valley at Hempstead Brook, east of Garden City, showing treeless horizon about $\frac{1}{2}$ mile away. No traces of cultivation in this view. Sept. 29, 1909.

The same thing has been mentioned incidentally in the catalogues of Isaac Hicks & Son, nurserymen of Westbury, L. I., and in "Long Island Illustrated," an attractive booklet issued annually by the Long Island Railroad.* In "Forest and Stream" for Aug. 15, 1908, I published a preliminary note on the subject, illustrated by a photograph.

For a generation or more the Hempstead Plains have been known to a few botanists as a good collecting ground, and every one who has traveled from New York to Cold Spring Harbor by rail, since

* Field operations of the Bureau of Soils for 1903, p. 99; or p. 13 of the "advance sheets" for this particular area, published in January, 1905. A somewhat similar statement occurs 27 pages farther on. I am also indebted to Dr. Bonsteel for the reference to Smyth mentioned above. ♣

† On page 19 of the 1907 edition it is stated that "Through the centre [of the island] will be found stretches of meadow blending into prairies of the western type"; but this statement does not appear to be in some editions a few years earlier.

the establishment of the Brooklyn Institute's biological laboratories there, has passed through several miles of what was once prairie, and seen a little which is still in its natural condition; but to this day the real nature of the area in question has apparently never been mentioned in botanical literature. Previous to the summer of 1907 I had been along the edges of the area, as defined by Bonsteel, in several places, and penetrated into it for short distances, without seeing any natural vegetation, so I supposed that the prairie was all occupied by villages, private estates, farms, etc., and that it was consequently no longer possible to verify the published statements about its original vegetation. But one day in July of that year I happened to cross the center of the area on foot, and was surprised to find that there are still thousands of acres on which the flora is practically all native. This is pretty good evidence that such areas



FIG. 2.—Looking W. N. W. in dry valley near southeastern corner of Hempstead Plains, showing a few small oaks and birches along the horizon. Sept. 19, 1909.

have not only never been artificially deforested, but also never been touched by the plow. Where the sod is once broken a very different flora, consisting largely of European weeds, comes in, so that areas which have ever been cultivated can be distinguished at a glance. The same is true to some extent of areas that have been too closely grazed.

The prairie occupies the central portion of Nassau County, about midway between the north and south shores of the island. Like the pine-barrens of Suffolk County, a few miles farther east,* it lies entirely south of the latest terminal moraine (the Harbor Hill moraine), but partly overlaps or dovetails into the older of the two Long Island moraines (the Ronkonkoma moraine). Originally it extended westward to where Floral Park now is and eastward to

*Torreya. Vol. 8, p. 2. 1908.

Central Park, a distance of about twelve miles, and had its greatest breadth from north to south of about seven miles very near its eastern end. North of the straight main line of railroad from Floral Park to Hicksville, and also west of Garden City and Hempstead, the original prairie vegetation has been almost totally obliterated; but a little south of Hicksville there are still a few places where one could describe a circle a mile in diameter without including a tree or a house or a field. Probably about one-fifth of the original prairie area is still in its natural condition, except for being intersected by roads.

The surface of the Hempstead Plains, like the rest of the southern or unglaciated portion of Long Island, is for the most part very flat, and slopes gently southward at the rate of about one foot in 300. It ranges in altitude from about 60 to 200 feet above sea-level. Traversing the plain in a general north and south direction are a number of nearly straight broad shallow valleys, ten to twenty feet in depth, which are believed by geologists to have been formed by glacial streams and not by recent erosion.* Within the limits of the prairie most of these valleys are now dry at all seasons, but farther south some of them contain permanent streams.

The soils of the area under consideration were described and mapped by Dr. Bonsteel's party, in the report already cited, as "Hempstead loam" and "Hempstead gravelly loam."† The former, which covers much the greater area, is a fine-grained loam, of a color which might be described as chocolate-drab, full of tough roots of grasses and other herbs near the surface, and passing rather abruptly at a depth of a foot or two into a coarse quartz sand and gravel of unknown depth. The "gravelly loam" phase is where the gravel comes to the surface, and it is chiefly confined to the slopes of the valleys above described.

Mechanical analyses of these soils are given in the government publications cited. Dr. E. W. Hilgard has kindly examined for me a sample of the "Hempstead loam" collected about a mile southeast of Hicksville in 1908, and finds it to consist almost entirely of clean quartz grains, with 1 per cent. of humus, .03 per cent. of lime (this in acid combination with the humus), and .04 per cent. of phosphoric acid (P_2O_5).

* A. C. Veatch, *Prof. Paper* U. S. Geol. Surv. No. 44, pp. 47, 52. 1906.

† In another publication of the Bureau of Soils, issued about the same time ("Instructions to field parties, and descriptions of soil types. Field season, 1904." Page 61) it is stated that the gravelly loam should have been mapped as Hempstead loam with gravel symbol; and the same statement is repeated in subsequent editions of this handbook.

Outlying areas in Kings and Suffolk Counties, mapped as "Hempstead loam" in the same report are now almost entirely under cultivation, and I know of no evidence that they were ever prairie.

The upland vegetation of the Plains comprises about four species of trees, a dozen shrubs, sixty herbs, and a few mosses, lichens and fungi. The commonest tree is gray birch (*Betula populifolia*), which in this region is oftener a shrub than a tree, and the other trees are two oaks (*Quercus Marylandica* and *Q. stellata*) and a pine (*Pinus rigida*), which are scattered sparsely over the eastern part of the area. The shrubs also are most abundant eastward. One of them is a willow (*Salix tristis*) and two are oaks (*Quercus ilicifolia* and *Q. prinoides*), and nearly all grow less than knee-high. The commonest herb is broom-sedge (*Andropogon scoparius*), a species of grass, which is said to be also common on some of the western prairies. The herbaceous vegetation, which is almost the only vegetation between Hicksville and Hempstead, with the exception of a ubiquitous shrub of the heath family (*Picris Mariana*), covers the ground pretty closely except in the most gravelly areas, is nearly all perennial, and averages about a foot in height.

Although the prairie vegetation grows in comparatively dry and sour soil, and gets about all the sunshine and wind there is in those parts, it exhibits no extreme xerophytic adaptations. A good many species, including several of the most abundant ones, have decidedly canescent foliage, and about half as many are glaucous, so that the whole landscape has rather a grayish tint. A large proportion of the species have very narrow leaves, but there are no succulents, and very few evergreens. On the other hand there are of course no very large or thin leaves.

Most of the trees and shrubs bloom in spring and most of the herbs in late summer. Most of the woody plants and about one-sixth of the species of herbs are wind-pollinated. Most of the colored flowers are either white, yellow or purplish, and none of them are very large or noticeably odoriferous. Wind is naturally the chief agent of dissemination, but the scarcity of berries and the complete absence of burs, in a region so accessible to birds and mammals, is a little surprising.

The dry prairies just described cover something like 99 per cent. of the area. The principal stream in the Plains is East Meadow Brook, which begins gradually, at an indefinite point varying with the wetness of the season, in one of the valleys about three miles east of Mineola and Garden City, flows nearly due south, and enters the woods about a mile from its source. Next in importance is Hempstead Brook, which flows right through the town of Hempstead. It takes its rise in a narrow strip of meadow just above the town, and its dry valley can be traced for a few miles to the north-

ward. Still farther west there are one or two smaller streams similarly situated and bordered originally by similar vegetation, but now considerably encroached upon by civilization. The wet meadow vegetation along these streams when viewed at a little distance does not differ much in aspect from that of the dry prairies, except that it is taller, many of the shrubs being as high as a man's head and the herbs knee-high. The species in the two habitats are of course almost entirely different, but their numbers happen to be about equal.

This prairie was originally bordered all around by forests, mostly of the oak type, but the border-line has been nearly everywhere obliterated by civilization, as it was a very attractive place for farms when the country was first settled, the woods on one side furnishing fuel, building material, good soil, protection from wind,

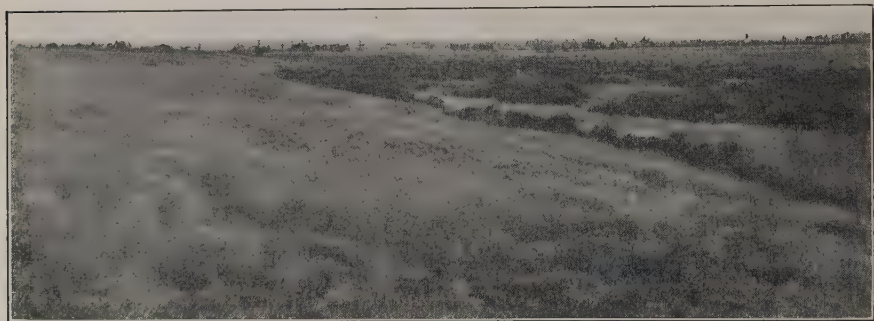


FIG. 3.—Looking up the valley of East Meadow Brook from a point about $2\frac{3}{4}$ miles east of Garden City. Hills of the Harbor Hill moraine in the distance. Except for a few scattered shade-trees, half a mile or more from the camera, this scene probably looks just as it did a thousand years ago. October 27, 1907.

etc., and the prairie on the other furnishing a good range for stock and an open place for buildings, etc., without the labor of clearing. At some places south of Hicksville only a single row of fields at present intervenes between the "Hempstead loam" prairie and the "Sassafras gravelly loam" oak forest, but in most places the original boundary of the prairie could now hardly be determined within half a mile. Before the country was settled the oaks were presumably encroaching on the prairie from all sides. But in the few places where pine forests border the prairie I have never been able to determine which way the tension-line is tending to move.

The cause of the treelessness of prairies has probably been discussed in geological, semi-popular, and non-botanical literature more than any other strictly botanical problem, and perhaps even

more than it has by botanists but no explanation has yet been found to fit all cases. Some of the partial explanations which have been suggested for the well-known prairies of the upper Mississippi valley will apply as well to the one under consideration, and some will not.* In a paper of such limited scope as this it would be out of place to attempt to review all the prairie theories, or even to mention all who have speculated on the subject; and only the briefest summary can be given here.

Among the western prairie theories which will not apply on Long Island are deficient rainfall, extreme variations of temperature, and impervious subsoil. The only previous attempt to explain the Long Island prairies (at least in print), that of Dr. Bonsteel, does not fit much better. In his soil survey report above mentioned he seems



FIG. 4—Looking up slough at western edge of valley of East Meadow Brook, $2\frac{3}{4}$ miles east of Garden City. Gravelly hillside at left. Sept. 29, 1909.

to imply that the absence of trees is due to the coarse dry gravel which underlies the whole area; a condition which is just the opposite of that found in some of the Illinois prairies. But within a few miles of our prairie there are soils still more gravelly and arid which are well wooded.

Our prairie is subject to a good deal of grazing, frequent fires, strong wind, and excessive evaporation, like the western ones, but these factors are the result rather than the cause of treelessness, so that they could hardly have determined the prairie in the beginning or fixed its present boundaries.

* The interesting papers of Shimek (*Proc. Ia. Acad. Sci.* Vol. 7, pp. 47-59, pl. 4. 1900) and Gleason (*Bull. Torr. Bot. Club.* Vol. 36, pp. 265-271. 1909) should be examined in this connection.

There are two suggestions that have been made with regard to the prairies of the Middle West which deserve more notice, though each leaves much to be explained. Alexander Winchell in 1864* summed up the opinions of most of his predecessors on the subject, indulged in some curious and perhaps not altogether essential observations on the vitality of buried seeds, and concluded that the "prairies were treeless because the grasses first gained foothold and then maintained it." The same idea has recently been expressed more elaborately by L. H. Harvey.† Prof. J. D. Whitney in 1876‡ distinguished between the arid plains toward the Rocky Mountains and the relatively humid prairies near the Mississippi River, showed the inadequacy of climatic theories to account for the latter, and pointed out that all such areas known to him were characterized by essentially horizontal strata, level surfaces, and finely divided soil. He distinguished between cause and effect, unlike some others who have written on the subject, but admitted his inability to show a causal relation between the conditions he described and the absence of trees. What he said about the topography and soil of the western prairies applies almost as well to those of Long Island§ (which he probably knew nothing about), and even to some other kinds of treeless areas, such as wet meadows and salt marshes.

Although the prairies of Long Island are closely correlated with a certain type of soil, it is still an open question whether most of the peculiarities of prairie soil, here and elsewhere, may not be due to long occupation of the same ground by herbaceous vegetation. In its mechanical analysis, and even in its color, the "Hempstead loam" strikingly resembles the "Galveston clay" (an arbitrary name for a well-known type of soil, the salt marsh) described in the same government soil report; but it is probably a little too early to jump to the conclusion that the area in question was once a salt marsh while adjoining areas were not.

Not the least interesting fact about this unique insular coastal plain prairie is that so much of it is still in a state of nature, although it is situated in a county which has been settled for 250 years and has about 300 inhabitants to the square mile, and is all within the zone in which it is profitable to haul farm products to New York by wagon. This state of affairs is probably due to a combination of several more or less independent causes. Good

* *Am. Jour. Sci.* Vol. 88, pp. 332-344, 444-445.

† *Bot. Gaz.* Vol. 46, pp. 86, 297. 1908.

‡ *Am. Nat.* Vol. 10, pp. 577-588, 656-667.

§ Mechanical analyses of the "Hempstead loam" by the U. S. soil people show that about 76 per cent. of it consists of particles less than $1/20$ of a millimeter in diameter, and that less than 3 per cent. of it is in particles exceeding a millimeter.

crops are raised on the parts that are under cultivation—with what margin of profit I have not ascertained—but the toughness of the sod, the thinness of the soil, and especially the scarcity of water, doubtless operate strongly to keep away new settlers unused to such conditions. The prairie farms have probably been handed down from father to son for generations, and the newcomers in the county (most of whom now come from the city or from Europe) are mostly settling in the villages, where they are independent of many of the local geographical conditions. That tradition has had a good deal to do with the preservation of the prairie is suggested by the following passage in the second edition of Thompson's History of



FIG. 5—Edge of small grove of pitch pine (*Pinus rigida*) in prairies about a mile southwest of Central Park. Aug. 25, 1909.

Long Island (Vol. I, p. 29, 1843), which would be almost equally true today:

"If the whole of this open waste was disposed of and inclosed in separate fields, the agricultural products of this portion of the island would be nearly doubled. A stupid policy, consequent upon old prejudices, has hitherto prevented any other disposition of it, than as a common pasturage. It is hoped the time is not far distant, when this extensive tract shall abound in waving fields of grain, yielding not only support, but profit, to thousands of hardy and industrious citizens."

It is said that A. T. Stewart, the merchant prince, when he founded Garden City and built a new railroad across the Plains,

about forty years ago, bought out the town's remaining interests in this land for \$55 an acre, and that a large part of it is still held by his heirs and leased to wealthy people living in the vicinity, who find it a splendid place for various equestrian sports in which they have long been accustomed to indulge. For several years past automobile races have been held on the better roads of this exceptionally level area, and the year 1908 saw the beginning of the "Long Island motor parkway" in this area, an undertaking which was no doubt facilitated by the scarcity of trees and farms. Still more recently the Hempstead Plains, for the same reason, have attracted considerable attention as the scene of a number of experiments in aeroplane flight.

Even if no more of this land were taken up in farms, the continued growth of New York City is bound to cover it all with houses sooner or later, and it behooves scientists to make an exhaustive study of the region before the opportunity is gone forever. Zoologists as well as botanists would find much to interest them here. According to Dr. W. C. Braislin* the Hempstead Plain was once the home of the heath-hen, which is now making its last stand on Martha's Vineyard. At the present time several other birds which are infrequent elsewhere, especially certain sparrows and larks, find a congenial habitat on the prairie, and insects, especially grasshoppers, are quite abundant at the proper seasons.

No one seems to have yet attempted seriously to enumerate, classify and explain the numerous and various treeless areas of Eastern North America. If this were done perhaps other areas similar in character to the one described might be found. There are abundant hints of small prairies, open glades, natural meadows, etc., in early descriptive works dealing with parts of the country that are now pretty thickly settled, and many examples of them have doubtless already been effectually obliterated, and irrevocably lost to science.

* *Abstr. Proc. Linn. Soc. N. Y.* Vol. 17-19 (1904-1907), p. 66.

RATIONAL STUDY OF TOPOGRAPHIC FORMS*

A REVIEW

BY

PROFESSOR W. M. DAVIS

The author of this large and imposing work understands by "Topologie" the rational study of topographic forms on a more detailed scale than is usually reached in works on physical geography. His monograph is in a sense a sequel to La Noë and Margerie's "Les Formes du Terrain" (Paris, 1888); but the more immediate impulse towards its preparation appears to have come from the new maps of parts of France, which have been produced by the Geographical Service of the Army in the last twenty years on a larger scale and with more faithful execution than the older maps. The work also accomplishes the author's wish of placing before the officers of the French army, for whom it is primarily intended, numerous extracts from recent geological treatises, which are regarded as indispensable in topological studies.

The chief divisions of the volumes are as follows:—Geology (pages 1 to 124), including something of structure, deformation and erosion, with a brief sketch of the structure of France, Algeria and Tunisia; mountains of moderate relief (125-243), such as the Vosges, the Jura, and the Saharan Atlas; high mountains (244-326), illustrated by examples from the French Alps, with glaciers, torrents, crests and summits, slopes and valleys for sub-headings; valleys in regions of moderate relief (331-432), treating longitudinal and transverse profiles, meanders, captures, and so on; plains and plateaus (433-525), in which parts of the Colorado canyon, reduced to 1:50,000 from the admirable 1:48,000 map of the U. S. Geological Survey, supplement the French examples; coastal features (526-568), treating sand and gravel beaches, cliffs, estuaries and deltas, with examples of fiords from Norway; and finally volcanic forms (569-643), with examples from Italy and Japan, as well as from central France.

There is an immense deal of valuable material in these massive volumes. No geographer can fail to profit from them. In view of the definition of "Topologie" as "*l'étude raisonnée des formes topographiques*" and in view of the abundant full page plates of fine topographic maps on large scales, the most pertinent passages in the text are those immediately concerned with existing land forms. In the account of the Vosges, for example, one finds a minute description (p. 134) of the domed crests, smooth slopes, narrow valleys and rounded valley-heads, all treated as the result of normal erosion in massive crystalline rocks. Again, in the account of the Atlas mountains (197), numerous striking examples of the relation of form to structure are described, involving all kinds of combinations of anticlinal, synclinal and monoclinal ridges, in various stages of continuity and of relief; and so on, through various chapters. Moreover the numerous plates are of exceptional value. Many of them are taken from the new map of France on the scale of 1:20,000, with 5-meter contours, as yet incomplete and generally inaccessible; thus providing remarkably fine illustrations of faithfully executed, detailed mapping. Others are on a scale of 1:200,000, giving only contours in black and rivers in blue, and thus bringing out general topographic features with great nicety; a number of sub-

*Topologie. Étude du Terrain. Par le Général Berthaut. 2 Vols. in 4to: i-ix, 1-330; 331-674 pages; 265 planches. Imprimerie du Service géographique de l'armée. Paris, 1909 and 1910.

mature valleys carved by meandering rivers are beautifully shown in this way. The maps of the Saharan Atlas are on a scale of 1:100,000, with unusually significant expression; they offer exceptionally fine examples of the control exercised by structure in guiding erosion and determining form.

Evidently the patient student of land forms must gain a vast amount of pertinent knowledge, as well as a valuable experience, in examining the elaborate text and the lavish illustrations of this great monograph. Yet we wish that he did not have occasion to meet so many rather accidental mixtures of explanatory and empirical treatment; for in this respect these superb volumes hardly represent the modern standard of geographical presentation. In the rational study of land forms, such as is here avowedly undertaken, explanation ought always to be consciously and systematically introduced as a means of description, insofar as it is safe and helpful; only where it cannot be thus applied should resort be had, intentionally and avowedly, to empirical treatment. It is therefore a disappointment to find an empirical treatment employed in describing districts which might safely be presented in explanatory fashion even by a relatively conservative geographer; for example, the northeastern outlier of the central plateau of France, known as the Morvan (p. 137), where the combination of two cycles of erosion is so manifest in the highlands and in the valleys which dissect them; and this disappointment is all the greater because an explicit account of the cycle of erosion is given in the introductory pages (95—), as if in preparation for its use later on. Again, the adoption of a rational treatment carries with it the introduction of a technical terminology, by means of which the forms that are at first elaborately explained can afterwards be easily recalled by the use of a brief name; yet when the valleys of the Vosges are treated in detail, as above indicated, they are described in paraphrased style, and very few technical and genetic terms are used. The absence of such terms is all the more curious, because the preliminary explanations in the earlier pages introduce such terms as young, mature, old, rejuvenated, and so on. But in spite of this, the scheme of the cycle and the genetic terminology that naturally goes with it remain for the most part as introductory abstractions, not applied in the body of the text.

As a result, while the descriptions even in their incompletely explanatory form will surely give much information to the serious student, they will not aid him greatly in phrasing concise descriptions of his own, because they are too often unsystematic and over-elaborate. This is much to be regretted, particularly in a work addressed to army officers; for it is precisely such officers who need not only the aid of rational understanding in the observations of land forms, but also the aid of systematized explanatory terminology in talking and writing about them. Indeed until an observer, be he of military or other profession, can give a clear and intelligible description of the landscape that is before him, he as well as his associates must remain in considerable doubt as to the sufficiency of his training. This point is not, in the opinion of the present reviewer, strongly enough emphasized in various books on military geography, in which as a rule no sufficient attention is given to the systematic and concise description of the visible landscape. As a matter of fact, the experience of various students of land forms has demonstrated that the most powerful means of conveying the meaning of an observer to the understanding of a hearer is found in some kind of explanatory method, with its appropriate terminology; and it is precisely in monographs as comprehensive as the one before us that a systematic and consistent explanatory terminology should be developed.

It cannot be too carefully borne in mind that, if land forms are to be treated rationally, and if their explanation is to serve as an effective means of description, the explanation must not be so cumbersome that the hearer's attention is carried to the past processes that have been concerned in producing the existing forms, instead of being held closely to the forms themselves. A directness of style should therefore be cultivated in explanatory physiographic texts, and irrelevant matter should be omitted, however important or interesting it may be in other connections. A single-minded attention to the meaning of the immediately visible landscape is essential in the rational study of land forms: hence the pages allotted to the nebular hypothesis of Kant, the pentagonal network of Elie de Beaumont, the tetrahedral theory of Green, and the "formule de l'océan pacifique" might well have been devoted to other topics in a treatise on French topography for French officers, however valuable these speculations are in theoretical geology. To be sure, all serious studies of past processes have their own value, along with other geological studies, as examples of explanatory speculations, more or less successful and convincing, concerning what has happened in earlier stages of the earth's history; but in handling geographical problems, the studies of past processes must be neither indirect nor inconclusive nor cumbersome, if they are to replace empirical treatment in the description of existing and visible land forms.

With this principle in mind, let the reader examine the account of the Côte d'Or between the Seine headwaters and Saône (p. 149—), and estimate the practical value of the explanatory treatment that is there attempted. This is a district in which faults are important structural features, yet in the special discussion of the influence of faults on the topography (159—) one finds no sufficient statement of matters so important as the measure of displacement, of the relative resistance of the displaced masses, or of the amount of erosion that has taken place since faulting. The treatment here ought to be fully modernized; yet it is only transitional between a frank empiricism which is satisfied with surface form because it knows nothing of structure, and a thorough-going explanation, which is unsatisfied until the influence of structure in guiding erosion to produce form is specifically and clearly and helpfully set forth. No effective use can be made of faults as an element of explanatory description in a district of so complicated structure as the Côte d'Or, until the examples of faults there found are introduced by a systematic series of deductively developed fault-forms in various stages of erosion, so that the reader can perceive the relation of the local examples to a general scheme. Only when the reader advances from a general scheme of this kind, equipped with a good assortment of type forms, each of which may be handily brought to mind by an appropriate name, can he effectively use the explanatory method in the treatment of faulted structures in various stages of erosional development. This systematic procedure is essential in order to reach practical results. Otherwise, a special explanation, unrelated to general considerations, has to be invented for every example of faulted structure; and such a procedure is so tedious that the most determined rationalist must abandon it and return to the blind simplicity of old-fashioned empirical methods.

The discussion of river meanders (397—), one of the most pleasing problems encountered in the explanatory treatment of land forms, is beautifully illustrated by a choice series of incised meandering valleys in various stages of erosion, and a matter so generally neglected as the down-valley migration of meanders is explicitly set forth; yet the treatment of this chapter is complicated

and inconclusive, and like the treatment of most of the other chapters, it furnishes no adequate terminology for practical use in the explanatory description of actual landscapes. The treatment of this particular subject is indeed in some respects out of date, for it sets out with the theory, advocated by Belgrand some years ago, that open-floored, mature valleys are the work of ancient rivers as wide as the valley floors during a former, more rainy climate (81,556), and concludes that meanders themselves are primarily due to a climatic change from heavier to lighter rainfall: "la principale cause première des méandres, qui existent partout, paraît être le passage d'un régime de pluies intenses, d'érosions et d'alluvionnements considérables, à un régime plus sec, comportant des cours d'eau réduits de volume" (429: see also 403, 409).

Another problem of importance in which the treatment is of insufficient generality is that of coastal forms. If there is any chapter of physiography in which the plan of describing actual forms in terms of the systematic series of forms evolved by the action of external forces upon structural masses, it is the chapter which deals with shore lines; yet coastal forms are treated in a somewhat disjointed and incomplete manner, from which the reader cannot easily perceive the normal, uninterrupted succession of their development. Many excellent examples are described and figured, but the chapter closes without reaching a sufficient breadth of treatment.

A curious insularity of method—if such a phrase may be used regarding a work produced in a continental country—is revealed in the citation of French authors only, with the occasional addition of foreign authors whose articles have appeared in French translation: the only exception being Salisbury and Atwood's "Interpretation of Topographic Maps." An insularity of this kind may perhaps work to the advantage of the foreigner who consults this great treatise by giving him a close view of French physiographic essays, as well as of French physiographic features; but it certainly works to the disadvantage of French readers, to whom the treatise is primarily addressed. Beautiful and varied as France is, extraordinary as are the features of its African possessions, rich as French geographical literature has come to be, the study of the forms of the land cannot be advantageously limited to sources in one language. Particularly unfortunate is such a limitation in a work addressed to the officers of the French army, whose appreciation of their home geography surely cannot be best developed by so exclusive an attention to home reading. Perhaps this limitation might have been avoided if there had been associated with the author, as there was with General de la Noë twenty years before, a younger civilian, who should have had at once a cosmopolitan acquaintance with geographical literature and a thorough training in scientific exposition.

We must heartily congratulate the distinguished author of "Topologie" on completing so formidable a work as is represented in these two volumes. It is a pleasure to figure to oneself the enthusiasm with which the work was carried on; and surely a great enthusiasm was needed as a support for the perseverance demanded in gathering the materials and writing the text of so large a treatise. One must furthermore rejoice that a rich budget provided the funds for publication in handsome form and for a most generous distribution to geographical libraries, where it shall be available for consultation by many readers. We bespeak for these valuable volumes, now in the Library of the American Geographical Society, a careful examination by students of the forms of the lands.

GEOGRAPHICAL RECORD

THE AMERICAN GEOGRAPHICAL SOCIETY

THE APRIL MEETING OF THE SOCIETY. A regular meeting of the Society was held at the Engineering Societies' Building, No. 29 West Thirty-ninth Street, on Tuesday Evening, April 25, 1911. Vice-President Greenough in the Chair.

The following persons recommended by the Council were elected to Fellowship:

Mrs. Arabella D. Huntington,
Norman James,

Walter Jennings,
William C. Wood.

The Chairman then introduced the Hon. John Green Brady, who gave a lecture on "Alaska." Gov. Brady was for twelve years Governor of the Territory. He treated Alaska in its geographical relations, varieties of climate, mining, fisheries, forests, agriculture and possibilities of large development. Many lantern views were shown, including maps.

AMERICA.

ANNALS OF THE ASSOCIATION OF AMERICAN GEOGRAPHERS. The Association has voted to establish a publication with the above title. The publication Committee is composed of Prof. Richard E. Dodge, Chairman and Editor; Mr. Alfred H. Brooks, Prof. Henry C. Cowles and Prof. Ralph S. Tarr. The *Annals*, for the present, will be an annual volume of about 200 pages containing selected papers read before the Association. The Committee is now receiving the manuscripts of papers read at the Pittsburg meeting.

The next meeting of the Association will be held in Washington during the holidays next winter, in connection with the meeting of the American Association for the Advancement of Science.

THE STATE GEOLOGICAL SURVEYS. The U. S. Geological Survey has just issued *Bull.* 465, "The State Geological Surveys of the United States." This is a most desirable work, for it has been difficult or impossible to obtain information about these surveys. A committee consisting of H. B. Kümmel, New Jersey, C. W. Hayes, U. S. Geol. Surv., F. W. De Wolf, Illinois, and W. McCulloh, New York, was appointed at Washington in the spring of 1910 to take charge of the matter. The committee decided that the end in view could best be attained by requesting the heads of the several surveys to prepare statements regarding the organizations. Mr. Hayes has compiled the *Bulletin* from these statements. Thirty-six states recognize geological work as a necessary and proper governmental function, and have organizations for the carrying on of such work. Idaho, Montana, New Mexico and Utah have had no state surveys.

CANAL ZONE TRIANGULATION SYSTEM. The primary triangulation of the Canal Zone has been completed by the Chief Engineer's Office. The *Canal Record* (April 5, 1911) prints a sketch of the triangulation showing the stations and the network of triangles. The new triangulation system has been made the standard for all survey and location work in the Canal Zone and has been designated as the "Panama-Colon Datum."

GLACIER NATIONAL PARK. The U. S. Geological Survey is now engraving a topographic map of the new Glacier National Park. This splendid playground, the youngest of our national parks, covers nearly a million acres in northwestern Montana just south of the Canadian line and includes the Lewis and Livingston mountain ranges, which constitute the northern Continental Divide. Throughout the area hundreds of peaks rise 8,000, 9,000 or 10,000 feet above sea level, alternating with sheer-walled canyons 1,000, 2,000 and even 3,000 feet in depth, at the bottom of which dash glacial torrents. More than 60 glaciers may be found in the park, some of them several miles in area. The map shows also many lakes, large and small, nestling in the old glacier-scoured basins. The park is described by the Federal topographers as a place of wondrous beauty, one of the most magnificent mountain regions in the world.

GOVERNMENT PHOSPHATE LANDS. About two years ago our Government withdrew from public sale large areas of land underlain by phosphate rock in the recently discovered fields in the public land States, with a view to securing legislation which would prevent exportation of the phosphate. Since then new deposits of phosphate have been discovered by the U. S. Geological Survey. The area now standing withdrawn is over 2,500,000 acres, containing an aggregate of many hundred million tons of phosphate rock and having a very great potential value to the farming industry. The acreage and location of the Government's phosphate areas standing withdrawn from public entry on April 1 are: Montana, 33,950 acres; Florida, 37,439; Idaho, 1,101,517; Utah, 107,745; Wyoming, 1,267,494. Total, 2,548,145.

GEOGRAPHY OF WORCESTER, MASS. A paper by Mr. Robert M. Brown of the State Normal School, Worcester, Mass., on "The Geography of Worcester," has just been published (83 pp., 8 figs). It is a systematic study of home geography intended for mature minds; and it cannot fail to be a good guide to teachers who may follow its plan and content to advantage in arranging talks or studies on home geography for the class room. Many of Mr. Brown's suggestions in the chapter "Map-Work" have been emphasized very little or not at all in the minds of most of our teachers of geography. This chapter may be especially commended for wide perusal. The pamphlet gives one of the best treatments of all the geographic relations of an important city that has yet been printed.

SOILS OF THE OZARK REGIONS. Many state and federal soil survey reports contain clear and accurate descriptions of soil characteristics, together with intelligent discussions of the relations of soils to topography and geology. A considerable number of reports show an appreciation of the geographic relations between the inhabitants and the soils of the areas. Professor C. F. Marbut in a recent bulletin on the "Soils of the Ozark Regions" has written a clear readable description of the structure, topography and soils of the Ozarks in Missouri, with an appreciative discussion of the relations of these factors to the people.

The Ozarks in Missouri, occupying an area of 30,000 square miles, is pre-eminently a region of limestone rocks. The Ozark uplift bowed the rocks into a gentle dome which was peneplained and subsequently uplifted. The surface is sub-maturely dissected, only a few remnants of the early plain remaining. Erosion on such a structure has produced three areas, fairly distinct in topography and soils.

The Ozark border is for the most part a prairie region with soils derived from Mississippian limestones. The Ozark plateau has rather uniform lime-

stone soils, the soil differences being largely due to topographic variants. The Ozark center is in part composed of crystallines which have been uncovered by erosion of the Ozark dome. Its surface is rough, and its soils are derived from flinty limestone, sandstones and crystallines.

The Ozark soils are relatively infertile when compared to the prairie and alluvial soils of Missouri, although they would compare favorably with many Eastern soils that are considered productive. The agricultural methods in vogue are not well adapted to local conditions. The extensive methods of raising wheat and corn which prevail in the prairies are not suitable for the Ozarks. When the methods and crops are properly adapted to the region, Prof. Marbut holds that the Ozark center will support a sparse agricultural population in the valleys by grain growing, while the uplands will be devoted to timber. Stock raising and dairying on the Ozark Plateau and dairying and general farming on the Ozark Border are best suited to these regions.

The permanent settlers of the Ozarks were for the most part from the Southern Appalachians, and except in the larger mining areas, the country is still largely peopled by their descendants. The early comers settled along the narrow flood plains or "bottoms." As population increased, settlement spread to the interstream uplands. Stock raising at first was the principal occupation, but with the exhaustion of the range, grain raising followed, with poor returns. Owing to decreasing returns from the land and subdivision of the original farms, the average farmer's income is less than that of his father. There is widespread discontent and eager search for more remunerative methods.

Professor Marbut's contribution is entitled "Soils of the Ozark Region, *Research Bulletin No. 3* of the Agricultural Experiment Station, University of Missouri." It includes 273 pages, structural sections and a colored map showing the distribution of soil types.

F. V. EMERSON.

LOW TEMPERATURES INJURIOUS TO ORANGES. During the cold weather of December 30-31, 1909, in Florida, some interesting observations were made by Civil Engineer Frank Merriwether, of Winter Park, Florida, in order to ascertain at what temperature oranges really freeze. Mr. Merriwether sat up the entire night of December 29-30, to watch his thermometers. Through a small hole in the rind of an orange hanging on a tree, the cylindrical bulb of a thermometer was pushed into the pulp, the rind fitting closely around the glass stem of the instrument. The readings were as follows: 9 P. M., 43°; 10 P. M., 40°; 11 P. M., 37°; 12 P. M., 35°. At midnight a second thermometer, similar to the first, was hung near the orange, in order to get the air temperatures. It appears that the orange must have begun to freeze at 5.30 A. M., when the immersed thermometer showed 26°, while the air temperature was 24°. After that time the mercury in the thermometer whose bulb was inside the orange, rose, as a result of the freezing. (*Monthly Weather Review*, Jan., 1910.)

R. DEC. WARD.

THE HANDBOOK OF AMERICAN INDIAN LANGUAGES. Part 1 of this work, prepared under the editorial supervision of Dr. Franz Boas, appears as *Bulletin 40*, of the Bureau of American Ethnology. It embraces vi and 1,069 pp. and contains, besides the contributions of Dr. Boas, papers by a number of collaborators. This work had its inception in an attempt to prepare a revised edition of the "Introduction to the Study of Indian Languages," by Major J. W. Powell. In Major Powell's introduction there was much linguistic material and many vocabularies, but the essential features of the morphology of American languages

were not known at the time his work was prepared. Special attention is called in the present work to the morphology and phonetics of American languages; and the necessity of an analytical study of grammar is emphasized.

AFRICA

THE EAST AFRICAN CENTRAL RAILROAD. Over 10,000 native laborers are employed in constructing this railroad from Daressalam to Tabora in German East Africa. The road has been completed to Kilimatinde, 374 miles from Daressalam. The track head is still 189 miles from Tabora, but it is expected that the lines will be in operation from the Indian Ocean to that important inland trade center by the end of 1912. Thus far, the Reichstag has provided only for building the line to Tabora, but according to the *Deutsch Ostafrikanische Zeitung* (No. 20, 1911), the extension of the line to Ujiji on Lake Tanganyika is practically assured. This extension will add over 200 miles to the length of the road, making the total length between the Indian Ocean and Tanganyika about 800 miles. When this enterprise is completed and the Belgian Congo extends its Upper Congo R.R. system to the western shore of Tanganyika, as it has decided to do, there will be uninterrupted steam communication by river, lake and rail, east and west across Africa from Banana at the mouth of the Congo, to Daressalam on the Indian Ocean.

TOPOGRAPHICAL SURVEY IN UGANDA. The *Geographical Journal* (April, 1911), reports that a topographical survey party under command of Capt. W. C. Macfie, R. E., arrived in Uganda in February, 1909, and were at work in the country for nineteen months, during which they surveyed 14,000 sq. miles on the scale of 1:25,000. The survey is of exceptional interest, as it completes the first accurate topographical survey of any considerable block of country in tropical Africa. This work, with the earlier surveys, completes a connected area of accurate topographical survey of no less than 32,000 square miles, a region about three-fourths as large as the state of New York. The maps are in course of preparation, and it is hoped that they will be published at an early date. Unfortunately, Lieut. Pennington and Corporal Corner, in the small party of ten men, died from the effects of the climate and the exacting work.

ASIA

CLIMATE OF PALESTINE. The climate of Palestine has long been a subject of interest, not only to students of the Bible, but also to the increasing number of persons who are looking into the question of climatic changes. An important study, "Zum Klima von Palaestina," has recently been published under the auspices of the German Palaestina Verein (*Zeitschr. Deutsch. Palaestina-Ver.*, XXXIII, pp. 107, ff. 1910). The writer is Dr. Felix M. Exner of Vienna. In this pamphlet of 60 pages, Dr. Exner has given a clear, concise account of the climatology of Palestine. The region, as is well known, is in the subtropical belt, and the dominant characteristics are the rainy and dry seasons. The annual rainfall is the most important climatic element from the practical point of view. The annual rainfall is small, and varies much from year to year, as is usual in these border-lands between different rainfall régimes. In general, wet years occur with low pressure over Palestine in winter, and dry years with high pressure. The winter low pressure area of the Mediterranean Sea extends over the coast of Syria, and the greater the eastward extension of this depres-

sion, the heavier is the rainfall over Palestine. The rains come from the Mediterranean, with southwest winds. In summer, on the contrary, the pressure is low in the east of Palestine, over the desert. The resulting west and north-west winds bring relatively cool air in summer. Dr. Exner points out that there are not available enough data regarding the rainfall to make possible, at present, any critical study of the outstanding hydrographic problems. A rainfall chart and two pressure charts are appended.

R. DEC. WARD.

AUSTRALASIA AND OCEANIA

THE GERMAN-DUTCH BOUNDARY EXPEDITION IN NEW GUINEA. The completion of the work of this expedition was recently reported. A despatch from Dr. Schultze, printed in the *Deutsches Kolonialblatt* for Feb. 15, adds new details as to the experience of the Commission while ascending the Kaiserin Augusta River, September to November, 1910. After the gunboats reached the limit of navigation the German and Dutch Survey parties went on in small boats assisted for a time by two steam launches. The longitude of $140^{\circ} 12'$ E. (which was $12'$ east of the boundary) was reached on Oct. 3, in $4^{\circ} 4' 18''$ S., and here a camp was formed. An attempt to push northward towards the point reached by the previous land expedition along the 141st meridian proved unavailing, the country being a level swampy plain like that which had hindered an advance from the north. The parties accordingly turned south to continue in boats the exploration of the Upper Sepik which is the name the natives give to the Kaiserin Augusta River. They reached, on Oct. 20, a rock defile by which the river emerges from the mountains. Above this point the river is a rapid, shallow stream, navigable only by light draught canoes. Contrary to expectation it proved to come from the east of south or in German Territory and thus is hardly suited, except for a short distance, to serve as part of the International boundary. It was traced with considerable difficulty to about $4^{\circ} 49'$ S., $141^{\circ} 15'$ E., when the north-west monsoon set in with violence, the rise of the river threatened to cut off retreat and so the return journey was begun. The Dutch party surveyed some of the tributaries while the Germans ascended one of the peaks near the turning point gaining, for the first time, a general idea of the configuration of the country traversed. Towards the west the view extended as far as Mt. Juliana in the Central Snowy Range. The Kaiserin Augusta River has now been ascended for 600 miles and at the farthest point reached appears to come from the direction of the Victor Emmanuel Range. (Condensed from *Geogr. Journ.*, April, 1911, pp. 452-453).

AUSTRALIAN METEOROLOGY. The Australian Commonwealth Bureau of Meteorology has recently published a new rainfall map of New South Wales, showing the isohyets for 5 or 10 inches. At each station the mean annual rainfall is shown in figures, the data being compiled from all yearly records available covering a period of 15 years and over. All figures are revised up to the end of the year 1908. This map for New South Wales is the first of a series, now in course of preparation, which will include all the States of Australia.

The first number (Vol. 1, No. 1) of the new *Monthly Meteorological Report of the Australian Commonwealth* bears date January, 1910, and gives good promise of being a valuable addition to the regular publications of the national weather services. It is especially to be noted that attention is paid to the cyclonic and anticyclonic tracks, and to the control of these areas over the

weather of the month. A rainfall and a temperature map are included. As compared with most other official publications of a similar kind, the Australian report is welcome in being compact, clear, and interesting.

A third publication, by E. T. Quayle, "On the Possibility of Forecasting the approximate Winter Rainfall for Northern Victoria" (*Bulletin* No. 5, March, 1910) deals with the relation of the winter rains to the preceding number of summer monsoon depressions. Some remarkable agreements are brought out, but there are also distinct disagreements, and it is as yet too early to come to any very satisfactory conclusions in the matter.

R. DEC. WARD.

EUROPE

THE POPULATION OF GERMANY. The census of Germany taken on December 1st, 1910, shows a population of 64,896,881 persons against 60,641,489 in 1905, 56,367,178 in 1900 and 49,426,470 in 1890. The increase in population in the last five year period was 4,255,392 or 6.56 per cent. The population of the states numbering over 1,000,000 inhabitants each was, on Dec. 1 last, as follows:

Prussia, 40,156,791; Bavaria, 6,876,497; Saxony, 4,802,485; Württemberg, 2,435,611; Baden, 2,141,832; Alsace-Lorraine, 1,871,702; Hesse, 1,282,219; Hamburg, 1,015,707.

POPULATION OF SWITZERLAND ON DEC. 1, 1910. The census of the Republic shows a population of 3,736,685 persons. The area of the Republic being 41,324 square kilometers the density of population is 90 to the square kilometer. In the eighteen cantons with predominant German population the number of inhabitants is 2,591,574, in the five cantons with predominant French population, 867,310, and in the two Italian cantons, Graubünden and Tessin, 277,810. The German cantons show a density of 129, the French of 77, and the Italian of 28 to the square kilometer.

PROF. CORA'S "COSMOS." All geographers will remember the excellent Italian geographical periodical *Cosmos*, established in 1873 and conducted by Prof. Guido Cora. Its publication has been suspended since 1896 but it has again appeared (Serie II, Vol. XIII). Prof. Cora announces that, beginning with January, 1912 *Cosmos* will be regularly published as a bi-monthly. It will maintain the geographical standard that established its reputation from its first appearance. The most conspicuous paper in No. IV, just received, is a geological study by Prof. Federico Sacco, entitled "L'Appennino settentrionale e centrale." The number concludes with an excellent department of book and map reviews.

POLAR

DR. MAWSON'S ANTARCTIC PLANS. Dr. Douglas Mawson, the physicist of the Shackleton Expedition and lecturer on mineralogy and petrology at the University of Adelaide, South Australia, read a paper before the Royal Geographical Society, London, on April 10, on scientific work in the Antarctic, the problems to be solved and the plans of the Australian Expedition which he will lead there about the close of this year. A part of the paper is printed in *Nature*, (April 13, 1911), from which the following information is taken:

"Because," says Dr. Mawson, "the Ross Sea area is more conveniently situated to the south geographic pole, most expeditions to the Australian quadrant have wintered there. This has led to the neglect of the great coast-line

westward of Cape Adare. Our information regarding it is very fragmentary, and for the most part untrustworthy. Properly equipped, an expedition to this region should have no difficulty in achieving great geographical success. In the words of Dr. H. R. Mill, 'It is time, at any rate, that someone should revisit lands discovered by Biscoe, Balleny, D'Urville, and Wilkes.' . . .

"Lying within wireless telegraphic distance of our borders, this region has a special call upon Australians. Alive to the value of scientific data there massed waiting to be collected I have ardently sought for an opportunity to reap the harvest. Captain Scott's programme was too full with the determined efforts in view upon the south geographical pole and King Edward VII Land, to accede to my request to be landed this year with a party at Cape Adare. It was then that Sir Ernest Shackleton proposed to raise the necessary funds, and, with myself in charge of the scientific work, to attack the whole coast-line between Cape Adare and Gaussberg. The plans were published in the press on March 19, 1910, and repeated later in the year. Eventually Sir Ernest Shackleton handed over the command to me.

"We hope to have a complement of fifty men (ship and land party) and proceed south from Australia about the close of this year. Practically every member of the land party will be a specialist in a particular branch of science. Most of the recruiting will be among the graduates of the universities of Australia and New Zealand.

"It is our intention to land several parties with stores and huts, to winter between Cape Adare and Gaussberg, and the ship will return to Australia and New Zealand for the winter, though not remaining idle. It had been our intention of dropping a few men at Cape Adare, for that is the easiest and most accessible landing on the Antarctic continent. The facilities there afforded of coal and stores left by Borchgrevink's expedition would have further simplified matters. In the light of recent events, of course, this must be eliminated from our programme. It is our special desire to accomplish a complete coast survey between the two points mentioned, and complete the magnetic charting of the region north of the south magnetic pole. The several wintering stations will simultaneously despatch coastal sledging parties on either hand, thus dividing up the task. A special journey will be made inland from our main base on the north coast to the south magnetic pole, thus completing, in conjunction with the former journey in which I participated, the crossing of that corner of South Victoria Land. For the rest, without entering into details, I may say that no branch of science will be neglected."

PHYSICAL GEOGRAPHY

CENTERS OF ACTION AND SEASONAL WEATHER. Within the last ten years numerous studies by Hann, Hildebrandsson, Meinardus, Teisserenc de Bort and others, have shown some remarkable correlations between the location and the development of the great "centers of action" of the earth's atmosphere and the character of the seasonal weather in adjacent, and even in remote regions. The whole subject is one which is receiving an increasing amount of attention. It is one of the most important aspects of the new "world meteorology," as it has been so well called. Curiously enough, although the effect of the smaller cyclones and anticyclones of our daily weather maps upon daily weather conditions has been long known, the effects of the larger, more permanent "centers of action" upon seasonal weather—a perfectly logical extension of this correlation—

have been only recently noted. Along these lines will undoubtedly run the long-range forecasts of the future.

Hildebrandsson has recently published a further contribution to this subject: "Sur la Compensation entre les Types des Saisons simultanés en différentes Régions de la Terre" (*K. Svensk. Vetenskap. Handl.* 45, No. 11). The same author had already suggested that the condition of the ice in the polar seas is the principal cause of a difference in the seasonal types, a matter which is also under investigation at the present time by Mossman, of the Argentine Meteorological Office. Hildebrandsson now calls attention to the fact that there is an opposition, both in winter and in summer, between the north and south of Europe and of North America; probably also between the sub-tropical and sub-polar regions of the Southern Hemisphere, and between the north of Europe and Siberia. There are some regions where the opposite character of the seasons is less pronounced in some years, and these Hildebrandsson finds to be intermediate between the main centers of action, and dependent upon the intensity of the latter. The whole paper is very suggestive of the growing importance of such broad studies of world meteorology.

R. DEC. WARD.

THE CYCLONIC UNIT IN CLIMATOLOGY. The importance of the cyclonic unit in climatological investigations, in addition to the conventional units of the day, the month and the year, is emphasized in a recent paper, entitled "The Study of Phenomenal Climatology" (*Quart. Journ. Roy. Met. Soc.*, Jan., 1910), by William Gardner Reed, Jr., of Harvard University. The discussion is based upon a series of thermograph and barograph curves for Nashua, N. H. After some study, it was found that the "temperature belt" (the strip between the lines connecting the crests of the thermograph curve and the troughs of the same curve) furnishes the best criterion for the classification of the cyclonic and anticyclonic units. Five classes of temperature belts are adopted, and a tentative scheme of summarizing the ordinary meteorological data according to these units has been devised. In order to put this scheme into practice, the author makes use of the weather conditions of Boston, Mass., for the first three months of 1909, and analyses them by the five classes of temperature belts. The paper is an interesting original contribution to a subject which is certain to receive more and more attention. Numerous typical thermograph and barograph curves are given, in illustration of the different units.

R. DEC. WARD.

PERSONAL

COLONEL P. K. KOZLOFF. This Russian explorer has received the Founders' Medal of the Royal Geographical Society for his explorations in Central Asia, since 1883.

DR. J. CHARCOT. The Royal Geographical Society has awarded the Patron's Medal to Dr. Charcot for his expeditions to the Antarctic Continent, first in 1903-05, and second in 1909-10.

GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY)

BOOK REVIEWS AND NOTICES

AMERICA.

Highways and Byways of the Rocky Mountains. By Clifton Johnson. xi and 279 pp., and illustrations. The Macmillan Co., New York, 1910. \$2.

A well written, well illustrated, attractive and generally readable volume having little to do with the Rocky Mountains, as more than half of the chapters are devoted to the Plains States. The author has described the picturesque features of life in the region west of the 100th meridian and has emphasized particularly the life that is passing, as portrayed to him by old settlers. Yet he seems nowhere to have yielded to the spirit of the plains and mountains and does not write as one who has seen beneath the superficial features and gained inspiration from the grandeur of space, the beauty of form, the glory of color and the impressive silence of these vast areas which contain so much that is awe compelling.

The volume is not geographical in tone, as it merely describes in an unsystematic way the striking phenomena of life and scenery, with no thought, seemingly, of portraying wholes or of giving clear-cut impressions that are satisfying to the reader. The book is not informational, evidently by design, and is disappointing. It is not a volume for the expert or the ignoramus, but will be of interest to the person who knows the section with some intimacy, for it will add some sidelights that are not usually brought out. It is a volume for a summer day and a hammock, not for the traveller who is preparing for a trip through the Rocky Mountains.

R. E. DODGE.

Myths and Legends of the Pacific Northwest. Especially of Washington and Oregon. Selected by Katharine Berry Judson. xvi and 145 pp., and illustrations. A. C. McClurg & Co., Chicago, 1910. \$1.50.

These Indian myths from the Northwest are typical of the child-like simplicity of the race in the face of the forces of nature and, for that reason, they may well find a place in the stages of the mental development of the child of the present. Most of the stories are connected with some physical feature of the country, as Mount Takhoma (?) the chinook wind and the rivers, while others are intended to explain certain animal characteristics as the run of the salmon and some are of a more general nature dealing with the problems of creation. The book is beautifully illustrated with photographs of the locations mentioned and among the fifty pictures are many which depict Indian types and characteristics. "A consistent effort has been made to tell the stories as the Indians told them" with the result of a very limping style which is somewhat tiresome for general reading. The preface is an admirable introduction to the spirit and contents of the book.

R. M. BROWN.

The Life and Times of Miguel Hidalgo y Costilla. By Arthur Howard Noll, LL.D., and A. Philip McMahon. vii and 200 pp., portrait of Hidalgo, and index. A. C. McClurg & Co., Chicago, 1910. \$1.

Mexican gold coins are stamped with the image of Hidalgo, and a nearly ideal profile it is. In this biography of the Father of Mexican Independence, the material entering into the account of historical conditions which made the life of Hidalgo significant was mined partly in Dr. Noll's previous works, "A Short History of Mexico," and "From Empire to Republic"; but partly it was obtained, with Mr. McMahon's aid, in the City of Mexico, where there is at least one very large private collection of original documents relating to the events of 1810-1811. It is all good material, and the character of Hidalgo—a somewhat idealized image—stands out clearly. We see him, during the years that preceded the insurrection, laboring earnestly and wisely for the improvement of the oppressed aboriginal population:

"He was assured that the Indians had capacities for something better than slavery in the mines or in the haciendas, which had been imposed upon them by the *conquistadores* with their detestable system of *repartimientos* and *encomiendas*, and which had been continued to his time. His first thought was for their industrial education. He would develop their own industrial resources, and teach them how to value their freedom."

His brief season of triumph, when he led an undisciplined multitude against the Spanish soldiery; his capture and imprisonment, trial and execution—all the essential features of the familiar story are given in this small volume, without elaboration and yet with some details which add new significance to the "Grito de Dolores." Special interest has always attached to events that are presented in Chapter VII, entitled "The Closing Scene":

"The trial of Hidalgo was delayed until he could be formally degraded from the priesthood and so be made subject to military or civil courts. To effect this, a delegate from the Bishop of Durango came to Chihuahua and performed the ceremonies of degradation. The fetters were removed from the prisoner and he was vested again in his priestly habit and presented before the ecclesiastical court thus provisionally instituted. Sentence of degradation was then duly pronounced. After the removal of his official garments, fetters were again placed on the old man and he was presented to the military tribunal to be tried, convicted, and sentenced."

"The heads of Hidalgo, [and his fellow revolutionists] Allende, Aldama, and Jimenez were brought to Guanajuato and placed upon pikes at the four corners of the Alhondiga de Granaditas. Thus a century earlier the heads of traitors had been placed upon the Tower of London. They were to serve as a warning that a similar fate awaited any in Mexico who chose to revolt against the Government, the Viceroy, the *Audiencia*, or the Holy Office. The effect was exactly the opposite of what had been expected. The ghastly heads thus exposed to view served to remind all who saw them that certain men had sacrificed their lives for the cause of the Independence of Mexico; and this aroused public curiosity and public opinion in Mexico upon the subject of personal rights and the meaning of Independence. The heads were removed from the pikes in 1825, when it was supposed that what these men had striven to attain and had fought and died for had been accomplished in Mexico. They were brought to the capital and buried in the apse of the great cathedral under the 'Altar of the Kings.'"

AFRICA

In Africa. Hunting Adventures in the Big Game Country. By John T. McCutcheon. 402 pp., maps and illustrations. The Bobbs-Merrill Co., Indianapolis, 1910. \$3.

Mr. McCutcheon, the well-known cartoonist, tells here the story of a four and a half months' trip in the big game country of British East Africa. The fact that he was an amateur sportsman really adds to the interest of his hunting trip in those fascinating regions. Humor abounds both in the letter press and in the illustrations which include superior photographs and also a large number of cartoons in Mr. McCutcheon's best style. The work will be included among the best African hunting books. It has a distinctive flavor which only a writer and artist of originality could give to it. Mr. McCutcheon got a great deal of fun out of his experiences and seems to have put a large part of it into his book.

Britain Across the Seas. Africa. A history and Description of the British Empire in Africa. By Sir Harry Johnston, G.C.M.G., K.C.B., D.Sc. xix and 429 pp., maps and illustrations. National Society's Depository, London, 1910. 10s. 6d.

The name of the author is recommendation enough to any one who is seeking information concerning Africa. The volume is an account of the occupation by the British of large portions of Africa. It is published under the auspices of the National Society "as it was thought desirable that a concise history of this racial enterprise should be published, which would not be too abstruse for young readers (whose previous knowledge of Africa might be assumed to be elementary), nor yet lacking in technical information to be of service to those who had left studenthood behind, but desired to learn rapidly how all these things came to pass in this continent of black, white and yellow peoples."

Each area of British occupation is treated at some length. The chapters include South Africa with Cape Colony, Transvaal, Rhodesia, Natal and Bechuanaland, a short chapter on the Mascarene Archipelagoes, West Africa and especially Nigeria, Egypt and the Egyptian Sudan, East Africa with Zanzibar, British East Africa, Uganda Protectorate and British Somaliland. An historical review is given for each area. The conditions have given opportunity to many men, and stamped upon the history of the land are many names such as Rhodes, Cromer, Stanley, Grey, Frere and a host of others.

The author, in his preface, suggests that he may not have done justice to his opinions but says that while he believes "that on the whole the British have been more righteous in their dealings with the native races of Africa than have some other of their European rivals, they do not hold the monopoly of virtue and disinterestedness."

More than half of the book is given to the struggles in the development of South Africa and the history of the British occupation there is reported in detail. Whatever of criticism is made against the various acts of the British in their struggle for South Africa, there can be no question concerning the great improvement which has followed the English flag. A chapter on the natives of British South Africa not only gives a catalogue of the tribes but adds an interesting list of names of native chiefs and notables among them, with a brief sketch of their contact with the British occupation.

Then follows an account of the struggles to gain a foothold on the West

Coast. While pepper was the inducement which turned the British to the West African Coast, there is no doubt that the slave trade and the thirst for gold was the incentive which gave the impetus to the seizure of most of West African lands. Here also is treated in detail the history of the explorations and struggles not only with the natives in actual war but also with the hostile nations of Europe in diplomacy which culminated in the accession of this territory. Following, Egypt and the Egyptian Sudan are treated in a similar style and the concluding chapter covers the British countries of East Africa.

Scattered through the book are valuable papers on special topics such as the Classification of Mankind and the division and place of the Negro Race, the Pepper Trade, the Tsetse Fly and Parasitic Diseases, the Products of British South Africa, the Principal Tribes of Nigeria, the Natives of the Egyptian Sudan and the Native Tribes of the British East African Dominion. The book is replete with interesting pictures of every phase of African life, animals, native peoples, invaders, homes, activities and physical features; and seven maps aid the reader in the interpretation of the text. It is a worthy addition to the works previously issued by the author.

R. M. BROWN.

ASIA

Kientchang et Lolotie. Chinois—Lolos—Sifans. Impressions de voyage, étude géographique. Par Dr. A. F. Legendre. 465 pp., illustrations and map. Plon-Nourrit et Cie., Paris, 1910. Fr. 5.

Dr. Legendre has spent years in China. His book is written for edification rather than amusement. It is the result of careful observation and study relating to the geography and the social and economic conditions in the far western parts of China. His journeys are illustrated by a map showing his routes and a considerable number of photo-engravings. His text conveys a clear idea of large districts in China that have been little known to us. Few writers have given a more complete view of the customs, mentality, and ways of life of any portion of the Chinese race and the book deserves to rank high among works on parts of Asia which are not yet well known.

L'Indo-Chine Française. Cochinchine—Cambodge—Annam—Tonkin. Par L. Faque. 185 pp. and map. Félix Alcan, Paris, 1910. Fr. 0.60.

One of the long series of little works on the Far East, published by Alcan. The book tells the story of French Indo-China from the earliest times, gives the history of the French occupancy, treats rather briefly of the geography of the region and then describes its inhabitants, resources and industries. Though a short work the reader will get a clear idea from it of these peoples, their land, the splendid development work which the French are doing and their high hopes for the progress and the future value to the world of the new realm under their flag.

Cook's Handbook for Tourists to Peking, Tientsin, Shan-Hai-Kwan, Mukden, Dalny, Port Arthur and Seoul. 116 pp., maps, plans and illustrations, Simpkin, Marshall, Hamilton, Kent & Co., Ltd., London, 1910.

The development of railroad travel in the Far East is attracting a considerable number of tourists and some guide books have been issued covering small parts of this region. The present handbook covers most of Eastern China which

has been opened to tourists in the past few years. All the information that will contribute to the comfort and convenience of travelers is given with maps and a vocabulary, in the Pekinese dialect, of words and expressions which will be useful to tourists. Travelers are advised, however, "to show these characters in preference to any attempt to pronounce them as the right tones are difficult to give and a very slight error in tone may alter the meaning of the word." A six days' sight seeing tour of Peking with a description of the places to be visited is one of the features.

Korea. By Constance J. D. Coulson. vii and 85 pp., map and illustrations. The Macmillan Co., New York, 1910. \$0.75.

Another of the popular books in the "Peeps at Many Lands" series especially adapted for young readers and beautifully illustrated with colored plates.

Die Japanische Kolonialpolitik. By Fritz Wertheimer. 100 pp., L. Friederichsen & Co., Hamburg, 1910.

A desirable contribution to colonial problems in the Far East. The author derived a large part of his material from his own studies in Japan and its dependencies. Japan's distinctive colonies are Hokkaido, Formosa, Korea, and the southern half of Sachalin Island to which Dr. Wertheimer adds Manchuria though it is not counted politically as a part of Japan. He discusses Japan as a colonial nation, describes each of the colonies, treats of the native and labor questions in them, gives statistics of colonial trade and outlines the policy and purposes of the Japanese colonial system.

Nord-Sumatra. Bericht über eine im Auftrage der Humboldt-Stiftung der Königlich Preussischen Akademie der Wissenschaften zu Berlin in den Jahren 1904-1906 ausgeführte Forschungsreise. Von Prof. Dr. Wilhelm Volz. Band 1: Die Batakländer. xxi and 395 p., 3 maps, 12 plates, 123 text figures, appendix and index. 10 x 7. Dietrich Reimer (Ernst Vohsen), Berlin, 1909. Mk. 18.

Even if this highly valuable document contained naught memorable or new, nothing of note, it would yet in its form remain invaluable as an exposition of the method of field work of the well trained German geographers. Dr. Volz has had the opportunity to open a new terrain, he has been the first in a wholly unbroken field, he has conducted a reconnaissance in a land whose horizon is as new to geography as it was unfamiliar to himself. We have had occasion of late to comment on British exploration in which clear evidence was presented that the pioneer of new lands was provided with a list of ready made interrogatories whose answer he was expected first to discover. The German method leads to far broader results, it is a model well worth the following.

Sumatra has a peculiar importance in geographical and in ethnographical study. Lying so intimately in touch with the continent of Asia it suggests itself at once, and indeed ultimately it proves to be, the channel through which the Indonesian province received its Asiatic contamination of life, vegetal and animal, including in the latter the human as well. Yet in large areas Sumatra has escaped study. The reason therefor is largely political, for the northern tip of the island is dominated by the Atjeh, Acheen of the usual charts, and it will readily be recalled that for a period measurable now by centuries this obstinately intractable folk has obdurately declined the efforts of generations of the Dutch to reduce them to subjection.

Dr. Volz attacked the problem between 1904 and 1906 and has succeeded most valiantly in prosecuting his mission of peaceful science where armed expeditions have been beaten back times without number. Four chapters of his book are the daily record of exploration, the narrative of the penetration of the eastern Karo country, the lands of the Pakpak, the western Karo country, and finally Toba land and Habinsaran. Interesting in itself, this daily narrative is of yet riper value as affording the amplest equipment for the comprehension of the varying local conditions that qualify his more general conclusions. The precision of this initial record affords complete proof that he entered upon his task, so brilliantly performed, with no preconception, with no theory that must be established. The style which beautifies every page shows that in competent hands the diary of march and camp must prove the most picturesque and certainly the most vivid form of presenting the results of any such scientific survey.

Based upon this reconnaissance report the six remaining chapters are rather fairly divided between geognostic discussion and ethnographic conclusion. With great propriety Dr. Volz establishes his geographical record upon the basic geology of the regions which he has explored. Inasmuch as the field of his operations lies close to the equator and under conditions of excessive precipitation we are to find it most appropriate that the author has devoted a considerable chapter, and that by no means the least valuable in a work which is throughout instructive, to a discussion of the morphological signification of aqueous denudation. In such a work as this a chapter adding so largely to our knowledge of this important phenomenon is as timely as are the studies of æolian denudation in the American survey reports of the great Colorado plateau.

In the ethnographical chapters Dr. Volz discovers four strata of population, three Malayan layers superimposed upon a substratum. This substratum has attracted his most lively interest and he has been at great pains to present the result of his investigations with intimate detail. That he has laid bare no recognizable evidences of the ancient Polynesian population of Indonesia accords with the conclusion at which I have arrived through independent investigation that Java and not Sumatra is the most westerly point at which we can feel at all certain of identifying the Polynesian ancestors. Of course their presence in Java argues an earlier passage through Sumatra, and Percy Smith has already pointed out the Polynesian affinities of the Mentawai off the western coast of Sumatra. It is most interesting that this explorer finds in his substratum traces of the primordial Melanesian culture, the use of the bow, the narrow shield, cannibalism and tattooing. The first and the last of these are indeed Melanesian, but we are not yet in a position to determine that they are an exclusively Melanesian possession.

We must regret that the otherwise brilliantly executed chart of the region explored lacks the geographical coordinates whereby the results could most accurately be correlated with existing maps of the region. This is all the more noticeable since Mr. Vohsen, who deals with his charts well nigh reverently, has put this map in the very capable hands of Mulder of Leiden, evidently to insure the correctness of the names, which for obvious reasons are in Dutch.

The concluding volume is shortly to appear and will be heartily welcome. Together they will form a monument worthy of the great Humboldt anniversary which they are intended to honor.

WILLIAM CHURCHILL.

AUSTRALASIA AND OCEANIA

Australia: The Making of a Nation. By John Foster Fraser. xix and 299 pp., 56 illustrations. Cassell & Co., London and New York, 1910. \$1.75.

The 300 pages of this book include a large amount of material of various kinds, geographic, social, political and ethical concerning Australia as it is to-day; and in addition the stages in the development of the cities and the industries are discussed. The pictures are many and cover a great variety of themes but in general they depict the best side of Australian life although the text plainly states that there is another side. The story is a double-faced one. "That is always the trouble in Australia. It is the land of extremes. It is the best land in the world and it is the worst land." Some of the chapters describe the cities and the states. The impressions of the cities are told largely by comparisons while the chapters on the states portray, through the stages of the struggle to form settlements, the deeper meaning of the country and comprise the best parts of the book. The author does not hesitate to criticise severely and he is also willing to praise highly so that the reader is impressed by his apparent desire to report the country fairly. There are special chapters on intensely interesting themes; one on the home life of the people presents a study in education and morality that is shocking; another on the problems of the railway shows the futility of the State control, a third on labor legislation is a remarkable presentation of the effects of trades union government, while other chapters cover the problems of immigration, population, settlement and education. Altogether, the writer takes a very hopeful view of the future of Australia notwithstanding the difficulties which are, in part, inherent in the country and, in part, the crudities of the pioneer stages. The account is based largely on personal observation. The book would have been more valuable to the general reader had a number of maps been added.

R. M. BROWN.

Otahiti. Au Pays de l'éternel Été. By Henri Lebeau. xviii and 259 pp. Librairie Armand Colin, Paris, 1911. Fr. 3.50.

The first impression of this slight volume is that the author has in mind by fine writing to compensate for the fact that his sojourn in Tahiti was compassed in six weeks. But when it is discovered that he criticises sagely and with discretion the South Sea studies of Pierre Loti and Robert Louis Stevenson it is recognized that his trick of fine writing is not assumed to cover any shortcoming. He writes well because he has a dainty taste in the selection of words with which to express his appreciation of the sordid streets of Papeete, indolent in all manner of iniquity, and of the contrasting grace of soul which fills him when his eye sets its gaze away from the dishonor of his own race and the death of the Tahitians and turns to the immemorial strength of the peaks of Moorea dominating the seaward view. His study is a work of no pretension. He sets forth that which it was given him to see in his short stay; he writes always with the feeling that the folk at home should know more than they do about the conduct of affairs in this colony of France in the South Sea. That his work is an indictment of the colonial administration is but an incident, deplorable yet inevitable. Tahiti is over-administered. It has a population of less than 10,000, yet in its annual budget provision is made for the salaries and incidental gratifications of 510 officials of diverse degrees of expensiveness. In comparison set New Zealand's colony in adjacent seas, the Cook Group; for a population of 30,000, three officials are found sufficient. The author follows the topic still

closer to the people. He shows how each tiniest community lives under the surveillance and by the favor of the omnipresent gendarme. With 510 salaries to pay, with an exorbitant system of licenses, with police restriction set upon all business and pleasure, the Tahitian finds life too expensive to come within his means. Hopeless of the future he settles down into apathy for the present, a victim of tyranny from above and sapped by vices from below, the Tahitian finds it cheaper to die, and being a Polynesian he is quite content to die and be out of it. Mr. Lebeau spent his six weeks to good purpose. His book is a trifle, yet it is valuable as a corrective of the visionary and poetical accounts of Tahiti which men of greater note have seen fit to present as the story of a dying race.

WILLIAM CHURCHILL.

Eastern Pacific Lands: Tahiti and the Marquesas Islands. By

F. W. Christian. 269 pp., 64 plates and index. Robert Scott, London, 1910. 7s. 6d.

Somewhat more than this was to be expected of the author of a really valuable study of the Caroline Islands. The inclusion in this volume of the Earl of Ranfurly's mediocre report on the annexation of the Cook Islands seems like padding. Mr. Christian's own narrative is the trivial record of brief visits to the two groups noted in the title. Tahiti is so well reported that even the best record of a short sojourn can add nothing to our knowledge. The Marquesas, on the other hand, have been so scantily studied that it is tantalizing to find that an observer of such long experience in the South Sea as Mr. Christian has proved so little observant. The volume will be a necessity to such as specialize in the geographical province of Oceanica, but it will add little in return for the space which it will occupy. Much of the work is devoted to comment on Stevenson and Herman Melville; the author's estimate of these predecessors scarcely makes up for the paucity of his own observations in the field.

In two appendices Mr. Christian has conveniently assembled topically the more valuable results of his investigation. He expresses himself somewhat positively in favor of the theory of an Aryan origin of the Polynesians and arranges several sets of linguistic data as confirmatory of that opinion. He accedes as well to the opinion of other students that the designation of the Malayo-Polynesian family is false. Yet it is noticed that in this material brought together to establish Aryan origin the author has set forth resemblances of the Marquesan speech with Japanese, Malayan and even Semitic; and such remote resemblances are scarcely to be considered as proof of any one source in particular, for these are surely remote from the Aryan.

The illustrations are of uneven value. Several reproduce originals which are now almost inaccessible. The best are such as represent artifacts of the Marquesas which exhibit variants upon more familiar types.

WILLIAM CHURCHILL.

Through Tropic Seas. By Frank Burnett. With an introduction by Bram Thompson. xii, 157 pp. and 68 illustrations. Francis Griffiths, London, 1910. 7s. 6d.

Mr. Burnett bought a little schooner and with his family went on a cruise among the South Sea Islands. He had visited them before and this book is the result of his extended observations of the islands and their inhabitants. It is not a commonplace record of travel. The author tersely describes what he saw. He minces no words in dealing with various aspects of the natives and indulges

in some pungent criticisms of the missionaries of to-day who, he says, are self-seeking, intolerant, uncharitable and particularly injudicious in the handling of the natives. The book gives a sharper and clearer view of the essence of many things Polynesian than we often meet with in mere travel literature.

The New Guinea. By Beatrice Grimshaw. viii and 322 pp., 49 illustrations, map and appendix. J. B. Lippincott Co., Philadelphia, 1911. \$3.50.

Somehow we suspect that Miss Grimshaw is losing her interest in the South Seas and her once beloved cannibals. This New Guinea volume lacks the freshness of the volume in which she set forth her introduction to the eastern islands, it has little of the sympathy of the volume in which she passed in review Fiji and the New Hebrides, there is none of that fellow feeling which rioted in her stories of Vaiti of the islands. To be sure she does find her cannibals in the wild west of Papua, as we are now to call British New Guinea, and she shudders a little at sight of their peculiar viand. Miss Grimshaw has scampered along the whole Torres Straits littoral of Papua, she has even exceeded the geographical scope of Dr. Seligmann's study of the region to which the student will turn for the facts. At the extreme west she has been the first European woman to penetrate the extremely long tribal houses in whose gloomy recesses she rather expected to be dined upon; in the extreme east of the Louisiades she has foregathered with those cheerful murderers who kill with their hands, eager fingers throttling throats. But the zest has left her, she has seen so much of the wild life that it has become an old story. For the first time we find her of set purpose educational, instructive. She discusses those topics which properly belong in a guide to intending settlers. She sets forth the terms and conditions upon which waste land may be taken up for settlement, she has her word to say about the supply of labor, she exhibits familiarity with the clearing of the virgin forest, she discourses upon the proper crops to set and the utilization of the land by catch crops while awaiting the maturity of the principal crop. Touched by the echo of the rubber craze which has seized the British market of rapid finance she has her advice to give as to the best rubber to grow, incidentally she spells the name of the Brazilian plant inaccurately and the same slipping tendency in orthography will foil those who seek many of her place names on the maps of New Guinea. This sort of information is valuable, it is well to bring it within the reach of those who seek to know more of this little known island; the disappointment lies in the finding that this spirited traveler has at last come down to writing with a blue book at her elbow. Strange irony of fate! The keynote of this book is that the British province of Papua has been made safe at last by the prudence of its administrator.

WILLIAM CHURCHILL.

EUROPE

The High Roads of the Alps. A Motoring Guide to One Hundred Mountain Passes. By Charles L. Freeston. xv and 388 pp., 106 itineraries, 102 photographic illustrations and 11 maps and diagrams. Kegan Paul, Trench, Trübner & Co., Ltd., London, 1910.

Mr. Freeston's ideal tour takes us to Geneva, into the French Alps about Grenoble, over to Turin, back to Mont Cenis, to Chamonix and Geneva again. Thence across the Foreland north of the Swiss Alps to the Tyrol. Thence over the Stelvio, "the goal of the motorist's aspirations," into Italy and back to

Geneva by the Simplon. Beautiful roads in the non-Swiss Alps but the Swiss high places are closed to motor-cars. He is plainly annoyed about this; it crops out in every chapter. The Swiss are afraid the awkward horse diligence will be upset, though they have no trouble in Austria, Italy or France. The stupid Swiss peasant has too much to say about local affairs and when he makes concessions on a few routes where the diligence service has ceased to exist he is not graceful about it. Thus on the Simplon a stamped time on your papers compels you to put in four hours on the 26 mile road from Brigue to Gondo! You may take your motor up the Swiss side of the Great St. Bernard *if a horse draws it!* This the author finds ridiculous. He is first and foremost a motorist. He revels in the free sweep of a high powered car that can devour the dull spaces. He advises about motor details. With a wide steering lock you may ascend most passes in perfect safety, even the 9,000 foot Stelvio. The Splügen, though lower, has corners so sharp that its ascent is a sporting feat, but that is exceptional.

He expresses very definite opinions. He scorns British roads as narrow, ill graded and abounding in hidden turns. He admires the superb National Roads of France that allow you to cross the country faster than the train can take you. He "notes with regret that an electric railway now runs across the Bernia Pass." He feels that railroads are allowed to cross the highways too freely. Horse drawn diligences are destructive of roads. Motor cars do them no harm. But he is a good traveler. He knows the value of careful study of your route. He gives details of a hundred passes he has crossed, motor details. He loves fine scenery and knows that high peaks or passes are not always the best viewpoints. His photographs make a charming selection of Alpine landscapes. He enjoys especially the Dolomites, the Lukmanier and Grimsel passes, the Simplon summits and the beautiful French Alps about Grenoble.

Heights and distances and all travel details are given clearly. Surely the motorist in the Alps will find this guide indispensable. MARK JEFFERSON.

The Norfolk and Suffolk Coast. By W. A. Dutt. 413 pp., illustrations and index. Frederick A. Stokes Company, New York, 1910. \$2.25.

The author says of the Norfolk and Suffolk coast that the only thing permanent about it is change. He mentions a village that he knew twenty years ago and says the waves of the North Sea now beat on a shingly shore at the place where it stood. As the official investigation of the changes of British coast lines has shown, this is a part of the coasts of England which has especially suffered from assaults of the sea. The book tells of these wasting coasts, the life of the people who live along them, great fishing ports such as Lowestoft and Yarmouth, growing watering places such as Gorleston, picturesque and historic regions, the marshlands and fens and the wild life of the country. This is one of "The Country Coast Series" in which all the coasts of England are being described.

A Literary and Historical Atlas of Europe. In "Everyman's Library." By J. G. Bartholomew, LL.D. xiv and 253 pp. E. P. Dutton & Co., New York, 1910.

The object was to provide the literary and historical student with the geographical data to illustrate the books he is reading. A similar atlas will be published of each continent. The small volume covers the essentials of European geography, defining not only frontiers and countries but also illustrating

history and literature. Ninety-six pages of colored maps show the changes that have marked the growth of European nations from the Middle Ages to the present day. Thirty-two pages of black outlines illustrate great battles of the world or relate to English literature, etc. There is, for example, a special map of the Lake District of England because this region is associated with Wordsworth, Coleridge, Ruskin and other authors. Another map gives places mentioned in Dickens's works. The maps are followed by a Gazetteer of places in Europe having a literary or historic interest and also a long list of geographical names giving the latitude and longitude of each place so that it may easily be found on a map.

Les Ports de Paris. Par Auguste Pawlowski. x and 156 pp. and 27 illustrations. Berger-Levrault & Cie, Paris, 1910.

The author treats the Seine and its tributary channels and canals as parts of one enormous basin with a single port, Paris. An exhaustive study is made of these waterways, all tributary to the port of Paris and carriers of its mighty commerce. The book gives an excellent idea of the commercial importance of the Metropolis as influenced by water communications.

Landeskunde von Frankreich. Von Dr. Richard Neuse. Vol. I, 140 pp., 39 maps, profiles, diagrams and photo-engravings. Vol II, 145 pp., 49 maps, profiles, diagrams and photo engravings. G. J. Göschen'sche Verlagshandlung, Leipzig, 1910. Each, 80 pfg.

A good description of France in all geographical relations, printed in comparatively small compass, but with content so methodically arranged, clearly and adequately expressed and so well illustrated by black maps in the text, a good map in colors and many photo-engravings, that the little volumes will be found very helpful.

The Spaniard at Home. By Mary F. Nixon-Roulet. 321 pp. and illustrations. A. C. McClurg & Co., Chicago, 1910. \$1.75.

The author is intimately acquainted with the Spaniards, has a sympathetic understanding of their temperament and her charming volume is written *con amore*. She discusses Spanish manners, customs and institutions, not as a casual observer but as one who has lived among this people and loves them. The book will give new light to many a reader who has only a superficial knowledge of Spanish character and institutions. Many who have not known the Spaniards intimately have held very inaccurate views of them and done scant justice to their admirable qualities and their great achievements in various lines of endeavor. This book will tend to correct such misapprehensions.

All peoples have their failings but, so far as the Spaniards are concerned, this book throws little light upon their weaknesses or upon any peculiarities that are not admirable; in other words the author deals almost entirely with the sunny and commendable features of Spanish life and character. To this extent the book may perhaps deserve some criticism. Among the topics are Infancy and Childhood in Spain, Courtship and Marriage, Women and Family Life, Amusements, Society, Church and Charity, Education, Literature and the Fine Arts, and Industries. The photo-engravings have been well-selected and produced.

POLAR

British National Antarctic Expedition, 1901-1904. Meteorology.

Part I. Observations at Winter Quarters and on Sledge Journeys with Discussions by various authors. Prepared under the superintendence of [W. N. Shaw] the Director of the Meteorological Office with the cooperation of a Committee of the Royal Society. xiv and 548 pp., 14 plates and 7 maps. Royal Society, London, 1908.

The volume contains the chief part of the results of the meteorological observations made by the Antarctic Expedition of Commander R. F. Scott. The data of the observations at winter quarters and on the sledge journeys are printed in full (pp. 17-364) with maps prepared by Lieut. Mulock to illustrate the geographical positions. Mr. Shaw in his preface gives the salient features of the climate according to the two years' experience of the explorers. Plates 2-5 are representations in colors of prismatic halos around the sun and other solar phenomena.

EDUCATIONAL GEOGRAPHY

Commercial Geography. By Edward Van Dyke Robinson. xlviii and 455 pp., maps and ills., index and appendix. Rand, McNally & Co., New York, 1910.

Readable, concise, statistical without being dry would apply to the text book of Commercial Geography by Prof. E. V. Robinson, Professor of Economics in the University of Minnesota. The author in his preface, holds that the subject treats of the localization of industries with respect to three sets of controls—the natural (geographic), the human and the economic, and that any factor can be neglected only under the penalty of the subjects becoming a mass of disconnected facts.

The treatment is divided into two phases: (1) the growth and factors of commerce and (2) regional descriptions including the commercial world, the proportion of space given to them being about one to four. The history of commerce, land and sea factors, climate, man, economic forces, transportation and raw materials make up part 1. Soils, topography, forests and coast lines are treated briefly as land and sea factors. Climate is well but very briefly treated. Race, religions and customs, language, nationality and governmental activities are the topics on human factors. Elementary economic principles of maximum, minimum and decreasing returns, war and substitution products form a short chapter. Other chapters are given to transportation and raw materials.

Part 2 is a regional description of the commercial world of which about one-half is rightly given to the United States. South America, Asia, Africa and Europe are taken in order. A final chapter deals with the principal industries of the world.

A pressing problem of a text book author is that of elimination. Out of the wealth of material, the important facts must be gleaned and emphasized. The book under review shows an advance over most others in this respect, although a rough estimate shows descriptions of over 200 commercial products and over 500 cities. However, the author in the case of the more important cities, especially those of the United States, describes them in terms of their environment. Indeed the geographic analysis of cities is one of the most valuable features of the book.

Ten pages are given to a condensed but fairly clear description of the

climates of the world. While the discussion is clear to one who has had some training in physical geography it is doubtful whether the secondary school student will get a working knowledge of climate from the author's presentation. He is more likely to obtain a vocabulary than an understanding, and an understanding is especially necessary since consistent reference is made to climatic factors in the discussions. The same comment applies to the discussion of physiographic features but this element is not so vital since less reference is made thereto in the regional descriptions. Perhaps the reviewer is prejudiced but it would seem that some details of products and places could be omitted and more adequate treatment of geographic factors substituted since those factors are basal to most of the regional descriptions. A misconception may be noted in the discussion of the Fall Line, page 116, which is described as a place "where the ocean formerly beat against the land," the inference being apparently that the Fall Line is a wave cut cliff instead of being due to the fact that the rivers, passing from the hard rocks of the Appalachian belt to the softer rocks of the Coastal Plain, more rapidly wear away the softer rocks, forming falls and cataracts. The book, in some respects is an advance on other text books on this subject.

F. V. EMERSON.

Industrial and Commercial Geography. By Charles Morris. iv and 323 pp., maps and illustrations. J. B. Lippincott Co., Philadelphia, 1910. \$1.10.

Of the thirty-one chapters in Morris's *Commercial Geography*, one each is given to general principles, the adaption of the earth to man's residence, industrial development, historical review, transportation, origin of industrial centers and one chapter to the climate and physiographic regions of the United States. Ten deal with the commercial products of the United States, thirteen with foreign countries and a final chapter, with the migrations of mankind.

It will be seen that the bulk of the book is descriptive and a large proportion is properly given to the United States. The style is direct and readable and the matter is elementary, evidently intended for students of about the ninth grade.

It will scarcely be disputed that commercial geography should deal for the most part with the important facts of commercial and industrial activity and that these facts should be explained as far as possible in terms of the underlying factors of economics and of physical geography.

In respect to the latter factor, the book, in the reviewer's judgment is open to considerable criticism, first, as to the sufficiency of treatment and, second, as to its accuracy.

Only a few paragraphs are given to climate and the principles are not considered. Rainfall, temperature and winds are presented as uncorrelated items. The surface features are somewhat more adequately treated but without a map showing the physiographic divisions. It is difficult to see how a reader could gain a clear idea of the geographic relations that are so vitally important to commerce and industry. New England's water power is mentioned but the relation to glaciation is not brought out. Indeed in a casual reading, no mention of glaciation or its far-reaching influences is found. The Fall Line is not mentioned specifically although the group of cities where the "rivers descend" is spoken of.

Besides the mode of treatment, one feels that the author has not an adequate knowledge of the geographic factors; and inaccuracies of statement or inference are not infrequent. The mild climate of the Northern Pacific coast of the

United States as compared with the same latitudes in the Atlantic coast is said to be due to the fact that "the Pacific yields warmer winds than the Atlantic" (page 55). The influence of the westerly drift is evidently not suspected. The idea that mountains are necessarily metalliferous is inferred (page 23).

As a geographic reader the book has some value. The illustrations are interesting although they do not especially illustrate the text and but seldom are reference made to them. The chapter on cities from a geographic point of view is well written.

F. V. EMERSON.

Elementary Physiography. By Rollin D. Salisbury. xi and 351 pp., maps and diagrams, profiles and other illustrations. Henry Holt & Co., New York, 1910.

This is an abbreviated edition of the author's *Briefer Course* and is intended for schools in which only half a year is given to the subject. The terse, vigorous style and logical arrangement which characterize Prof. Salisbury's text-books are retained in the shorter volume.

The author has shortened the course not in general by omitting topics but by abbreviating and simplifying them. This leaves a large number of topics to be assimilated by the high school student in about four months. It is probable that better results would be obtained by amplifying a smaller number of the more important topics.

A valuable feature that has been retained almost in its entirety in the shorter volume is the discussions of the life relations to the various inorganic factors and these discussions are especially valuable in that the instances are specific instead of general. Prof. Salisbury in his latest text-book does not follow some geographers who would lay more emphasis upon life responses and less upon physiographic processes and results. The life element, although excellently treated forms an incidental rather than a vital part of his discussions. The illustrations are well chosen and are so used as to form an integral part of the text.

F. V. EMERSON.

PHYSICAL GEOGRAPHY

Descriptive Meteorology. By Willis L. Moore, LL.D., Sc.D., Chief of the United States Weather Bureau. pp. xviii—344. Charts 45. Figs. 81. D. Appleton & Co., New York, 1910.

Seventeen years have elapsed since the publication of Professor W. M. Davis's admirable "Elementary Meteorology," and fifteen have gone by since Dr. Frank Waldo gave us his smaller book, with the same title. Both of these books have done excellent service. There has, naturally enough, been a growing demand for a newer text-book of meteorology, in English, presenting the recent developments of a science which has advanced with such remarkable rapidity during the last ten or a dozen years. The time was most opportune for the publication of Professor Moore's "Descriptive Meteorology," which we feel sure will meet a very general need on the part of a large number of teachers and students all over the United States. The author's object was "to provide, so far as possible, the young men entering the service of the United States Weather Bureau with a comprehensive introduction to modern meteorology," but, as the author rightly says, "to meet their needs in this particular is to provide equally well for all others who are beginning seriously this important science."

We welcome the new book. It will do good work in advancing the study of the science of the atmosphere. Professor Moore has covered the usual ground,

and has done it well. He has given rather more space than is perhaps necessary to the physical conditions and processes at the beginning of this book; to the composition of the atmosphere, and to optical phenomena. He has dismissed with comparatively brief mention such important topics as the distribution of temperature and pressure over the earth's surface. It is perfectly natural, in view of the author's position as Chief of the Weather Bureau, and of his main object in writing the book, that special emphasis should be laid on the work of his colleagues in the Weather Bureau and on the work of the Bureau itself. We cannot help feeling that too much space has been devoted to Professor Bigelow's investigations of cyclones and anticyclones, of vortex phenomena, and of the general circulation of the atmosphere, important as these studies are. There is, it should be noted, but scant reference to recent European work along similar lines. The general reader will, we are afraid, gain a somewhat one-sided view of some of the recent advances in meteorology if he confines his studies to Professor Moore's book. In other words, the Weather Bureau tinge is somewhat too pronounced.

For teaching purposes, the "Descriptive Meteorology" lacks something of the logical and systematic arrangement which is characteristic of Professor Davis's earlier book. There is also a rather striking lack of adequate explanation of many rather essential subjects, such, for example, as the defective effect of the earth's rotation. We regret to see the classification of the winds given as permanent, periodic and non-periodic. But it is not the province of a reviewer to pick out small details which he himself happens to dislike. In spite of what seem to us some rather regrettable faults, Professor Moore's book is one which will certainly receive, and deserves to receive, a hearty welcome. It will serve, and serve well, to disseminate among a large number of earnest students sound meteorological knowledge. And it will doubtless be read with great profit by many persons who have been waiting for just such a book, and who can in no sense be called students of meteorology. It will fill the need which, during the past ten years, has been increasingly felt by a larger and larger number of our teachers who are concerned either with meteorology directly, or with the larger number of our teachers who are concerned either with meteorology directly, or with the larger aspects of general geography. We call particular attention to the short bibliographies which are placed at the end of all the chapters, and will prove extremely useful. The important work of Professor W. J. Humphreys on the temperatures of the free air is well summarized in Chapter VIII. The chapter on Forecasting is particularly clear, interesting, and well illustrated. This chapter will prove very helpful to the general reader.

We cannot help expressing regret that an American text-book of meteorology should make such inadequate mention of the admirable work done at the Blue Hill Observatory, under the direction of Professor A. Lawrence Rotch, during the past twenty-five years. And we also wish to point out that a book which weighs, as this one does, about three pounds, is a striking illustration of the extreme inconvenience which our American publishers cause their readers by reason of the continued use of wholly unnecessarily heavy paper.

R. DEC. WARD.

Physische Meereskunde. Von Prof. Dr. Gerhart Schott. 143 pp., maps, illustrations and index. G. J. Göschen'sche Verlagshandlung, Leipzig, 1910. 80 pfg.

An excellent compendium of oceanography by one of the leading authorities on the subject. After a short history of the development of the physical study of

the sea, Dr. Schott treats of sea depths and the methods of measuring them, the forms of the sea floor, the area and volume of the sea, the physical-chemical characteristics of sea water, its salinity, gas content, color and transparency, distribution of temperatures at the surface and in the depths, ice conditions, currents and other phenomena of the movements of sea water, causes of the ocean streams, etc. Good maps and other illustrations and an index add to the value of the work.

GENERAL

Karanog. The Romano-Nubian Cemetery. By C. Leonard Woolley and D. Randall-Maciver. Vol. III, Eckley B. Coxe Junior Expedition to Nubia. xi and 286 pp., illustrations and index. Vol. IV, Plates. 115 plates and plan. Univ. of Pennsylvania, Egyptian Dept., of the Univ. Museum, Philadelphia, 1910.

These volumes are part of a series that will record the results of the explorations in Egypt planned and financed by Mr. Coxe of Philadelphia. The expeditions are being conducted on behalf of the University and the antiquities obtained will form part of the collections of the University Museum. The authors of these reports are Curator and Assistant Curator of the Egyptian Department of the Museum who are conducting the excavations. The archaeological discoveries which they made near the village of Anibeh on the Nile, are described in the text and the second volume is filled with photo-engravings and colored plates showing a large variety of objects which they unearthed. A representative series of painted pottery and bronzes were retained by the Egyptian Government and the remainder were taken to Philadelphia.

The Evolution of Worlds. By Percival Lowell, A.B., LL.D. xiii and 262 pp., and illustrations. The Macmillan Co., New York, 1909. \$2.50.

A revised edition of the course of lectures delivered by Prof. Lowell before the Massachusetts Institute of Technology in February and March, 1909. He presents in them the most recent facts and speculations concerning the past and future of the solar system, discusses the inner and outer planets and their formations and advances some theories that are not widely accepted.

The Fight for Conservation. By Gifford Pinchot. vii and 147 pp. Doubleday, Page & Co., New York, 1910. 60c.

In the solution of the problems of Conservation as a basic proposition, Mr. Pinchot finds the remedy for many of our national issues, such as the improvement of the life of the farmer, the security of business, the increase of morality, and the education of the children. The book is based on a series of addresses made at various times and in this, no doubt, lies the explanation of the repetition of arguments and conclusions which appear constantly throughout the book. Compared with the book recently put on the market by Van Hise, it is inferior. It deals more in platitudes and leans too optimistically on the belief that this movement will cure our national ills. There is, however, power in the book even if one fails to follow the writer into the distant future; and in certain sections where the author is dealing with the issues of his calling, there is inspiration.

R. M. BROWN.

NEW MAPS

NORTH AMERICA

UNITED STATES GEOLOGICAL SURVEY MAPS

TOPOGRAPHIC SURVEY SHEETS:

Georgia-North Carolina-Tennessee: Ellijay Quadrangle, 1:125,000 (1.97 miles to an inch). Contour interval, 100 ft. ($35^{\circ}-34^{\circ} 30'$ N.; $84^{\circ} 30'-84^{\circ}$ W.).

Minnesota: Barrett Quad., 1:62,500 (0.99 mile to an inch). Interval, 10 ft. ($46^{\circ}-45^{\circ} 45'$ N.; $96^{\circ}-95^{\circ} 45'$ W.); Herman Quad., 1:62,500. Interval, 10 ft. ($46^{\circ}-45^{\circ} 45'$ N.; $96^{\circ} 15'-96^{\circ}$ W.).

New York: Neversink Quad., 1:62,500. Interval, 20 ft. ($42^{\circ}-41^{\circ} 45'$ N.; $74^{\circ} 45'-74^{\circ} 30'$ W.).

Ohio: New Lexington Quad. 1:62,500. Interval, 20 ft. ($39^{\circ} 45'-39^{\circ} 30'$ N.; $82^{\circ} 15'-82^{\circ}$ W.).

Pennsylvania: Butler Quad., 1:62,500. Interval, 20 ft. ($41^{\circ}-40^{\circ} 45'$ N.; $80^{\circ}-79^{\circ} 45'$ W.).

Texas: San Marcos Quad., 1:125,000. Interval, 20 ft. ($30^{\circ}-29^{\circ} 30'$ N.; $98^{\circ}-97^{\circ} 30'$ W.).

Utah: Frisco Special Map. 1:62,500. Interval, 50 ft. ($38^{\circ} 32'-38^{\circ} 23'$ [$21'$ N.; $113^{\circ} 21'-113^{\circ} 3'$ W.]).

Wisconsin: Winnebago Special Map. 1:62,500. Interval, 10 ft. ($44^{\circ} 15'-43^{\circ} 45'$ N.; $88^{\circ} 34'-88^{\circ} 15'$ W.).

ALASKA. Index Map of Alaska Showing Areas Covered by Topographic Maps. 1:5,000,000 (78.91 miles to an inch). March, 1911. [Distinguishes between areas covered by exploratory maps (1:625,000), reconnaissance (1:250,000), and detailed (1:62,500) surveys. Contains a list of maps of Alaska published by the U. S. G. S. and, on the reverse, a list of Recent Survey Publications on Alaska.]

MAINE. Map Showing the Distribution of Granite and Related Rocks in Maine and locations of quarries in pegmatite deposits. 1:1,000,000 = 15.78 miles to an inch. 4 colors. Illustrates *Bull.* 445 "Geology of the Pegmatites and Associated rocks of Maine," by Edson S. Bastin. Washington, 1911.

PENNSYLVANIA. Economic and Structural Map of the Johnstown Quadrangle, Pennsylvania. 1:62,500 (0.99 mile to an inch) ($40^{\circ} 30'-40^{\circ} 15'$ N.; $79^{\circ}-78^{\circ} 45'$ W.). Contour interval, 20 ft. Plate 1 of "Mineral Resources of Johnstown, Pa., and Vicinity," by W. C. Phalen and L. Martin (*Bull.* 447). [Shows coal and clay out crops and structural contours, detailed section through the Carboniferous of Pennsylvania and a list of mines with numbers referring to location on the map.]

U. S. HYDROGRAPHIC OFFICE CHARTS

Pilot Chart of the North Atlantic Ocean, April, 1911.

Pilot Chart of the North Pacific Ocean. June, 1911.

U. S. WEATHER BUREAU CHARTS

Meteorological Chart of the North Atlantic Ocean, June 1911.

Meteorological Chart of the South Atlantic Ocean, June, July, August, 1911.

Meteorological Chart of the North Pacific Ocean, June, 1911.

Meteorological Chart of the South Pacific Ocean, June, July, August, 1911.

Meteorological Chart of the Great Lakes, June, 1911.

Meteorological Chart of the Indian Ocean, June, 1911.

U. S. DEPARTMENT OF AGRICULTURE MAPS

New York: Soil Survey of Washington Co., N. Y. 2 sheets. 1:62,500.

Pennsylvania: Soil Map of S. W. Pennsylvania. Scale 1 inch = 4 miles (1:253,440). [Embraces Beaver, Butler, Clarion, Jefferson, Washington, Allegheny, Armstrong, Indiana, West Moreland, Greene and Fayette Counties. Accompanies "A Reconnaissance Soil Survey of S. W. Pennsylvania," by H. J. Wilder and C. F. Shaw, Bureau of Soils, Dept. of Agriculture, Washington,

1911. Distinguishes in 10 tints between residual (4), glacial (1), colluvial (1) and terrace and bottom land (4) soils. Relief suggested by symbols for "steep broken" and "rough mountainous" topography.]

Washington. Soil Survey Maps of the Eastern part of the Puget Sound Basin. 4 sheets. 1:125,000.

ALASKA. Sketch Map of Alaska showing Distribution of Forest, Glaciers and Snowfields. 1 inch = 150 miles. 4 colors. Illustrates "The Forests of Alaska," by R. S. Kellogg, in *Bull.* 81, Forest Service, U. S. Dept. of Agric., Washington, 1910. [Colors show distribution of timbered and sparsely timbered areas, regions above timber, glaciers, snowfields and tundra.]

CALIFORNIA. Geological Map of the Sargent Oil Field, Cal. 1 inch = 1,400 feet. 14 colored symbols show geological formations; distribution of oil wells indicated. Illustrates Univ. of Cal. Publ. *Bull.* of the Dept. of Geol., Vol. 6, No. 3, Berkeley, 1911.

NEW YORK. (a). The Catskill and Croton Water Supply Systems of New York. [Sketch map showing supply systems and the aqueducts connecting them with the city]; (b) Revised areal geology of Southern Manhattan Island and the adjacent margin of Long Island. 4 colors. [Based upon exploratory borings to June 25, 1910. A blue line marks the course of the tunnel intended to carry the Catskill water to Brooklyn]; (c) Map showing geologic formations along the proposed lines for distribution conduits. 6 colors. Illustrates "Geology of the New York City (Catskill) Aqueduct," by Charles P. Berkey. N. Y. State Mus. *Bull.* 146, Albany, 1911.

CANADA. Standard Topographical Map. 1:250,000 (3.95 miles to an inch). Dept. of the Interior. Sheet 3, N.W. (Ontario: Kingston Sheet. 45°-43' 15" N.; 77°-75° W.).

CANADA. Map of Canada. Minerals. 100 miles to one inch. (1:6,336,000.) Geological Survey of Canada, Map No. 1042. To accompany Reports Nos. 1085 and 1086. 1909. [Shows, by colors, on the base map compiled in the Chief Geographer's Office, Dept. of the Interior, the distribution, areal and topical, of 32 minerals.]

CANADA. Map of Canada. Geology 1:6,336,000 (100 miles to an inch). Geological Survey of Canada, Map No. 1084. To accompany Geological Publications, Nos. 1085 and 1086. 1909. [A valuable general geological map of Canada, superseding the larger two-sheet map of older date.]

CANADA. Index Map to Townships in Manitoba, Saskatchewan, Alberta and British Columbia. Scale, 35 miles to an inch. (1:2,217,600.) Accompanies the Annual Report of the Topographical Surveys Branch, 1909-10, Dept. of the Interior, Ottawa, 1911. [Latest edition, brought down to April 1, 1910, of the map showing the subdivisions of the public land of Western Canada into townships. It is indispensable for locating townships, of which township and range numbers are given, but would prove more serviceable if the geographic co-ordinates were shown. This would require no additional work as they necessarily have been constructed as the basis for plotting the map.]

CANADA. Sketch Maps (Scale 6 miles to an inch [1:380,160]). Showing Topography of:

1. the 18th Base Line, from Range 9 to Range 14, W. of 6th Meridian, Alberta (about 55° N. near 120° W.).
2. the 17th Base Line, from Rge. 27 W. of 5th Mer. to Rge. 9, W. of 6th Mer., Alberta (about 54½° N., west of 118° W. for 48 miles).
3. the 16th Base Line across Rges. 1, 2, 3 and 4, W. of the 6th Mer., Alberta (about 54° N., west of 118° W. for 24 miles).
4. the 3rd Meridian from Township 52 to Township 60 and of the 16th Base Line between the 3rd and the 4th Meridians, Saskatchewan. (106° W. from 53½° to 54° N., and 54° N. from 106° to 110° W.).
5. Part of the 4th Mer., Tp. 63 to Tp. 80 (110° W. between 54½° and 56° N.).
6. the 15th Base Line between the 3rd and the 4th Mer. Saskatchewan (about 53¾° N., between 106° and 110° W.).

7. the 15th Base Line across Rges. 25, 26 and 27, W. of 5th Mer. and Rges. 1 to 8, W. of 6th Mer., Alberta (about $53\frac{3}{4}^{\circ}$ N. for 18 miles E. and 48 miles W. of 118° W.).

8. the 10th Base Line across Rges. 8, 9, 10 and 11, W. of 5th Mer., Alberta (about 52° N. near 115° W.).

9. the 9th Base Line across Rges. 8, 9 and 10, W. of 5th Mer., Alberta (about $51\frac{1}{2}^{\circ}$ N. near 115° W.).

[These nine maps accompany the Annual Report of the Topographic Surveys Branch, 1909-10, Dept. of the Interior, Ottawa, 1911, and illustrate the separate reports of the Dominion Land Surveyors. Drainage in blue, relief in brown shading, in contour manner.]

SOUTH AMERICA

BOLIVIA. The River Heath and Adjacent Territory. 1:500,000 = 7.89 miles to an inch. By Major P. H. Fawcett, R. A. 4 colors. With section of the Inca Mining and Rubber Co's. Road. 1 inch = 32 miles with vertical scale exaggerated ten times. Illustrates paper "Further Explorations in Bolivia: The River Heath," same author. *Geogr. Journ.*, April, 1911.

CHILE. Mapa de Chile. 1:500,000 (7.89 miles to an inch). Oficina de Mensura de Tierras. Edición Centenaria. Santiago, 1910. Sheets [no individual title] (a) 17° - 19° S., 70° $50'$ - 68° W.; (b) 41° - 43° S., 75° - 71° W.; (c) 43° - 45° S., 76° - 71° W.; (d) 45° - 47° S., 76° - 71° W. [Relief in brown shading, drainage in blue, culture in black and red, the latter for boundaries.]

AFRICA

EGYPT. Topographic Map of Egypt. 1:50,000 (0.79 miles to an inch). Survey Dept. of Egypt. Sheets XXXVII—V. S. E. (El Derr: 22° $48'$ - 22° $36'$ N.; 32° - 32° $15'$ E.), XXXVII—VI S.E. (Korosko: 22° $48'$ - 22° $36'$ N.; 32° $15'$ - 32° $30'$ E.), XXXVIII—IV S.E. (Toshka: 22° $36'$ - 22° $24'$ N.; 31° $45'$ - 32° E.), XXXIX—III S.E. (Adendan: 22° $24'$ - 22° $12'$ N.; 31° $30'$ - 31° $45'$ E.). [Topography restricted to immediate valley of the Nile.]

EGYPT. Geological Map of Egypt. 1:1,000,000 (15.78 miles to an inch). 20 colors. Survey Dept. of Egypt. Sheet 1: West Delta and Libyan Desert (32° - 28° N.; 25° - 31° E.). Sheet 2: East Delta and North Arabian Desert (32° - 28° N.; 31° - 35° E.). Sheet 3: Western Oases. (28° - 24° N.; 26° - 31° E.). Sheet 4: Arabian Desert (28° - 24° N.; 31° - 36° E.). Sheet 5: Libyan Desert (24° - 20° N.; 29° - 31° E.). Sheet 6: Nubian Desert (24° - 20° N.; 31° - 37° E.).

EGYPT. Geological Map of Egypt. 1:2,000,000 (31.56 miles to an inch). 20 colors. Survey Dept. of Egypt. [A valuable reduction of the detailed sheets of the Geological Maps of Egypt, 1:1,000,000, affording a general survey of the geology of the region between the Mediterranean and 22° N. and between the Red Sea and a line connecting the Gulf of Salum (25° E.) with Wadi Halfa, and of the southern part of the Sinai Peninsula. The same somewhat unsystematic classification of geological terranes, partly on formational, partly on petrographic grounds, is used as on the detailed sheets.]

MADAGASCAR. Carte du Pays Mahafaly. Par le Lieut. Bühner. 1:500,000 (7.89 miles to an inch). 2 colors. Illustrates paper, same name and author. *La Géogr.*, No. 6, 1910. [Surface forms shown by approximate contours with ten meter intervals. The map supplies new detail for this region.]

MOROCCO. Region de Casablanca. 1:400,000 (6.33 miles to an inch). Illustrates "Casablanca" by Lieut. Sagonds in *Bull. Soc. de Géogr. d'Alger et de l'Afrique du Nord*, 3e Trim., 1910, Algiers. [Based upon the map in 1:100,000 of the Service Géographique de l'Armée, supplemented by several itineraries. A rough idea is given of hill features. All routes centering in the seaport are shown together with the telegraph line, many elevations in meters, ruins and place names. An accompanying sheet denotes the same area as distributed in steppes, forests, and cultivated lands.]

SAHARA. D'Insalah au Niger, par l'Ahaggar. 1:2,000,000 (31.56 miles to an inch). 3 colors. Insets of Idelès and Irafok el Foghania in 1:15,000 and

of Tamanrasset, Ahaggar in 1:75,000. 3 colors. Illustrates "A travers le Sahara. Du Tidikelt au Niger par le Ahaggar," by N. Villatte, in *La Géogr.*, No. 3, 1911. [Gives an important amount of new detail. The itineraries are based upon 48 astronomical positions fixed.]

ASIA

ARABIA. Map of Northeast Arabia showing the routes of Capt. G. E. Leachman, 1910, and other explorers. 1:2,500,000 (39.46 miles to an inch). 3 colors. Illustrates "paper same title and author, in the *Geogr. Journ.*, Vol. 37, No. 3, March, 1911, London."

CENTRAL ASIA. (a) Map showing portions of Chinese Turkestan and Kansu to illustrate the exploration of Dr. M. Aurel Stein, Indian Archaeological Surv., and his assistants R. B. Lal Singh and R. S. Ram Singh, 1906-08. 1:3,000,000 (47.34 miles to an inch). 3 Insets in 1:1,000,000; (b) Map showing portions of Kun-lun range, Chinese Turkestan. 1:1,000,000 (15.78 miles to an inch); (c) Map showing portions of the Western and Central Nan-Shan to illustrate the explorations of Dr. Stein and Ram Singh, 1907. 1:1,000,000. *Geogr. Journ.*, Vol. 37, No. 3, March, 1911, London. [Dr. Stein made the explorations which these maps illustrate under the orders of the Indian Government. The maps were reduced from the map in 94 sheets of the Indian Survey, which are based principally upon the plane table surveys carried on continuously during his travels by Dr. Stein and his topographical assistants. These surveys were also supplemented by astronomical observations for latitude and by triangulation. In the transcription of Turki and Iranian names, he followed the system of phonetic transliteration approved by the International Congress of Orientalists and used in a simplified form for Indian Government publications.]

DUTCH EAST INDIES. (a) Solor-Eilanden. Schetskaart van het Eiland Adonara. 1:200,000 (3.15 miles to an inch). 2 colors; (b) Schetskaart van het Eiland Lomblem. Same scale. Illustrates paper "Beschrijving der Eilanden Adonara en Lomblem, Behoorende tot de Solor-Groep." Door Kapitein J. D. H. Beckering. *Tijdsch. kon. Nederl. Aardrijksk. Genootsch.*, Tweede Serie, Deel XXVIII, No. 2, Leiden, 1911. [Based upon surveys made in 1910. Approximate contours give an idea of the topography, elevations are in meters, and the nomenclature is large.]

GERMAN NEW GUINEA. Keizerin Augusta-Rivier. 1:200,000 = 3.15 miles to an inch. Black. *Tijdsch. kon. Nederl. Aardrijksk. Genootsch.*, Tweede Serie, Deel XXVIII, No. 2, Leiden, 1911. [A short description of the map appears in the text. This most detailed map of the large river yet made is based upon the survey of the steamer *Pionier* in July, 1910. Numerous soundings are given together with the nature of the bordering vegetation.]

FRANCE. Cartes des Gisements de Coquilles Comestibles de la Côte du Finistère: (I) comprise entre Le Hâvre de Guisseny et Portzpoder, 1:35,000 approx. (0.55 mile to an inch), (48° 41'-48° 30' N.; 4° 55'-4° 25' W.); (II) comprise entre Portzpoder, et la Pte. du Petit Minon, 1:30,000 approx. (0.47 miles to an inch). (48° 30'-48° 18' N.; 4° 50'-4° 37' W.). Dressées par J. Guérin-Ganivet, Naturaliste attaché au Service Scientifique des Pêches au Ministère de la Marine. Accompany *Bull.* No. 203 de l'Institut Océanographique, Monaco, March, 1911, with similar title by same author. [These two maps show the distribution of edible molluscs on the N.W. coast of the Bretagne, compiled for July, 1910, and distinguish by colors nine species.]

FRANCE. Glaciers du Massif des Grandes Rousses. Carte dressée en août 1905 et 1906 au cours des campagnes glaciologiques effectuées par G. Flusin, Ch. Jacob, J. Offner. 1:10,000 (0.15 mile to an inch). Accompanies "Études glaciaires, géographiques et botaniques dans le Massif des Grandes Rousses," by the above author, published in "Études glaciologiques, Service d'Études des Grandes Forces Hydrauliques (Région des Alpes)," Ministère de l'Agriculture, 1909. [Detailed map of this massif of the French Alps in the manner of the maps published by Alpine Clubs. Rock surfaces in brown hachures, glaciers in blue contours.]

FRANCE. Schéma orographique et hydrographique du Massif des Grandes Rousses, 1:50,000 (0.79 mile to an inch), par Ch. Jacob (Planche 1); Schéma des extensions glaciaires les plus récentes dans le Massif des Grandes Rousses [1:50,000] par Ch. Jacob, (Planche II of "Études glaciaires, etc. par G. Flusin, Ch. Jacob, J. Offner," in "Études glaciologiques, Ministère de l'Agriculture," 1909.) [Drainage in blue, crest-lines and terraces in black, extension of glaciers on Planche I, in red.]

ITALY. Carta Politico-Amministrativa del Regno d'Italia colle linee ferroviarie e di navigazioni. Scala di 1:2,000,000. (31.56 miles to an inch). Istituto Geografico de Agostini, Novara. Lire 1.50. [Shows the boundaries of the provinces and their subdivisions and indicates railroads and steamship lines, canals, cable-lines. A map of a more popular type and of inferior execution, especially with regard to relief, than the majority published by this efficient firm.]

ITALY. Carta Topografica dei Dintorni di Torino. 1:50,000 (0.79 mile to an inch). Istituto Geografico de Agostini, Novara. Prezzo, Lire 1.00. [Excellent map of the environs of Turin, showing houses and built-up areas in red and the slopes of the Monferrato Hills in contours and shading.]

ITALY. Carta Fisico-Politica delle 69 Province Amministrative del Regno d'Italia. 1:3,000,000 (47.34 miles to an inch). Istituto Geografico de Agostini, Novara. Prezzo, L. 0.30. [In spite of its title, this is purely a political map showing, by colors, the extent of the political subdivisions of Italy.]

ITALY. Pianta di Torino. 1:10,000 (1.15 mile to an inch). 5 colors. Istituto Geografico de Agostini, Novara, 1910. L. 1. [A fine map of Turin with accompanying descriptive text and an index which facilitates finding buildings, streets or places.]

ITALY. Dintorni di Roma. 1:250,000 (3.95 miles to an inch). 5 colors. Istituto Geografico de Agostini, Novara. L. 0.50. [An excellent map of Rome and its environment, topographically colored, with communications prominently indicated and a large nomenclature.]

ITALY. Pianta di Roma. 1:12,000 (0.18 mile to an inch). Istituto Geografico de Agostini, Novara. Accompanies "Guida di Roma e Dintorni." [A city map of the highest quality and artistic execution. Delineates built-up areas, using separate symbols for public buildings and monuments of antiquity. It is divided into three strips to facilitate consultation.]

POLAR

WEST ANTARCTICA. Maps to illustrate paper by Dr. J. B. Charcot on the French Antarctic Expedition 1908-1910. (a) After the Expedition of the "Belgica" 1898, and before the expedition of the "Français," 1903-1905; (b) After the Expedition of the "Français," 1903-1905; (c) After the First summer voyage of the "Pourquoi Pas?," 1908-1909; (d) After the second summer voyage of the "Pourquoi Pas?," 1909-1910. 1:5,000,000 (78.9 miles to an inch). 3 colors. Illustrates "The Second French Antarctic Expedition," by Dr. J. B. Charcot, in *Geogr. Journ.*, Vol. 37, No. 3, March 1911, London. [This series well illustrate the large amount of geographical information which the two Charcot Expeditions added to our maps. The maps show the results of his surveys of islands, and the mainland coast line, his determination of many heights and depths and his discovery of new land in 70° S. Lat.]

ATLASES

Atlante Geografico Muto, físico-politico a colori. 25 plates. Istituto Geografico de Agostini, Novara, 1910. L. 2.25. [An excellent series of sheets, blue tints used to show sea depths, shades of brown and green for elevations, and red lines for political boundaries. Hydrography is well outlined and all physical detail is expressed very clearly considering the small scale of the maps. A fine example of the superior map work which this establishment is producing under the supervision of Prof. Dr. G. de Agostini.]

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No. 6

GLACIERS OF PRINCE WILLIAM SOUND AND THE SOUTHERN PART OF THE KENAI PENINSULA, ALASKA

III.—GLACIERS OF THE WEST COAST OF PRINCE WILLIAM SOUND*

BY

U. S. GRANT AND D. F. HIGGINS

The western shore of Prince William Sound south of Passage Canal is away from the usual routes of travel, and has been little visited even by prospectors. As a result the details of the shore line have not been well shown on recent maps, most of which have evidently relied on the information furnished by the older Russian charts. The glaciers also have not been studied until very recently, and they have been shown in a generalized manner or omitted entirely from the maps. In 1887, Captain S. Applegate explored and first mapped the upper part of Port Nellie Juan†, and in 1905, 1908 and 1909 the writers made a reconnaissance of the west shore of Prince William Sound for the United States Geological Survey. The results of the mapping of 1887, 1905, 1908 and 1909 have been in-

* Published with the permission of the Director of the United States Geological Survey.

Earlier articles in this series appeared in the *Bulletin*, vol. 42, 1910, pp. 721-738, and vol. 43, 1911, pp. 321-338. A general map of Prince William Sound, showing the location of the various fiords and bays noted below, accompanies the first of these articles, and another map, showing in more detail the northwestern part of the Sound, accompanies the second article.

† Quoted by George Davidson. The glaciers of Alaska that are shown on Russian charts or mentioned in older narratives. *Trans. and Proc. Geogr. Soc. of the Pacific*, series 2, vol. 3, 1904, pp. 1-98.

corporated in two recently published small scale maps.* The glaciers of this area have not, as far as our knowledge goes, been figured or described before, but some of them have been mentioned briefly.

PASSAGE CANAL

There are no glaciers which reach tide water on Passage Canal, although several approach the canal from the north, west, and south-



FIG. 1.—Map of Blackstone Bay, July 5, 1909. Photographs of the glaciers were taken from points marked A, B, C, and D.

west. The Seth and Billings glaciers descend southward from the same general ice field which feeds the Harriman Glacier and end within about a mile of the north shore of Passage Canal. Northwest of the upper part of the Canal are at least three smaller glaciers

* U. S. Coast and Geodetic Survey, Chart No. 8550, 1909. U. S. Geological Survey, *Bull.* 442, pl. 2, 1910.

draining into this body of water.* The most important ice stream near the Canal is the Portage Glacier, described below.

PORTAGE GLACIER

A hasty visit was made by our party to the head of Passage Canal (Portage Bay) on July 3, 1909. The eastern terminus of Portage Glacier was too far distant from the shore and too much hidden by a low bare rocky point in the gravel-filled valley to permit of any careful observations. It is probable that no large part of the glacier debouches on the east side of the divide between Passage



FIG. 2—One of the eastern ice lobes of the Blackstone Glacier from Point C of Fig. 1, July 5, 1909.

Canal and Turnagain Arm, for no large glacial stream enters the head of the Canal. A trail over this glacier was much used as a route from Prince William Sound to Cook Inlet till the Seward-Sunrise trail was opened. In 1898 Mendenhall visited the head of Passage Canal and crossed the portage to Cook Inlet. His description of this portage and the glacier† is of much interest, and the following paragraph is from his report:

* The *Bulletin*, vol. 43, 1911, p. 322, fig. 1.

† Mendenhall, W. C., A reconnaissance from Resurrection Bay to the Tanana River, Alaska, in 1898. *Twentieth Ann. Rep. U. S. Geol. Survey*, pt. 7, 1900, pp. 273, 325-326.

"The isthmus which connects Kenai Peninsula with the mainland is only about 12 or 13 miles broad from tide water to tide water, and probably stands but little above sea-level; but for 5 miles of this distance it is buried under a glacier which flows from the high mountains of the peninsula to the south. This glacier at its highest point is about 1,000 feet above tide, and can be crossed in a few hours from the open waters of Portage Bay by prospectors or others who desire to reach Sunrise City or the headwaters of Cook Inlet before this body of water is open to navigation in the spring. For more than a hundred years it has been used as a route, first, by the Russian and Indian traders, and later by miners, who usually cross it without difficulty in the winter or early spring. In the summer the crevasses open, and it is but rarely used, especially since at that



FIG. 3.—Western tide-water part of front of Blackstone Glacier from Point D of Fig. 1, July 5, 1909.

season the all-water route is so much easier and cheaper. On the morning of our first trip across the portage a light rain was falling at the foot of the glacier, but before we reached its highest point we found ourselves enveloped in a blinding blizzard, which obliterated the well-beaten trail and hid completely from our view all landmarks which might serve to guide us. Fortunately the storm was at our backs, and helped rather than retarded our progress but even then, had it not been for bushes which earlier travelers over the same route had stuck in the snow to mark the trail under just such conditions, we should have been hopelessly lost."

BLACKSTONE BAY

The early maps of the shore line between Point Culross and Passage Canal were inaccurate, probably due to the fact that none

of the explorers making these maps followed closely the intricacies of the shore line. Blackstone Bay was fairly well shown except for its head, but Cochrane Bay was poorly delineated, and Culross Passage was not shown at all. Vancouver's map (1794) of this district and Tebenkof's (1849) have formed the basis for other and later maps. Applegate's map of 1887 adds some detail, and is the first map we have access to which indicates the Tebenkof Glacier. The passage (Culross) behind Point Culross was reported by the U. S. Geological Survey reconnaissance of 1905 and indicated on Chart No. 8502 of the U. S. Coast and Geodetic Survey in 1907.

On the maps of Vancouver and Tebenkof "ice and snow," which undoubtedly refers to a glacier discharging into the sea, are shown



FIG. 4.—Central tide-water part of Blackstone Glacier from Point D of Fig. 1, July 5, 1909.

at the head of Cochrane Bay and the description* indicates the same fact. There is evidently a mistake in locating this glacier,—it should be at the head of the next bay to the west (Blackstone Bay),—for there is no evidence that in historic time a glacier occupied the head of Cochrane Bay. The land at the head of this bay is comparatively low, and this low land extends south-southwest to Port Nellie Juan. The glacier seen by Vancouver was evidently the Blackstone Glacier which reaches the tide water at the head of Blackstone Bay.

Our information concerning the glaciers of Blackstone Bay was gained by a hurried reconnaissance on July 5, 1909. No information concerning the definite positions of the fronts of these glaciers at an earlier date is extant.

* Davidson, George. The glaciers of Alaska that are shown on Russian charts or mentioned in older narratives. *Trans. and Proc. Geog. Soc. of the Pacific*, series 2, vol. 3, 1904, p. 23.

TEBENKOF GLACIER

The front of the Tebenkof Glacier comes within about a mile and a quarter of the shore of a small bay on the south side of the entrance to Blackstone Bay, and is named after Capt. M. D. Tebenkof, Governor of Russian America from 1845 to 1850. This



FIG. 5—Map of Port Nellie Juan, August 8 and 9, 1908.

glacier is an ice stream of from a mile and a half to two miles in width which flows northward in a valley parallel to Blackstone Bay. The ice field of this glacier is continuous with that of the Blackstone Glacier (Fig. 1). The Tebenkof Glacier has a comparatively low slope and its front lies on a flat of glacial débris. This flat has in

places a forest which would indicate that the glacier had not reached tide water in the last century, and probably not in a considerably longer period. On both sides of the front of the glacier there is a bare zone, estimated at 500 feet in width, which has apparently recently been covered by ice. The date of this advance, which probably destroyed part of the forest at the west edge of the glacier, is uncertain, but from the lack of vegetation on the bare zone it is thought that this advance took place within the last 10 or 15 years. The front of the glacier was not visited, and so nothing is known of the actual distance between the present front of the glacier and this recent advanced position, which marks the point of maximum advance since the growth of the present forest.



FIG. 6.—Front of Nellie Juan Glacier from Point A of Fig. 5, August 8, 1908.

BLACKSTONE GLACIER

The Blackstone glacier surrounds the head of Blackstone Bay, sending down from a very extensive ice field no less than ten ice streams (Fig. 1). Two of these streams have discharging cliffs at sea-level and two others on the east side of the bay reach just to high tide on gravel aprons formed at the lower ends of the alpine valleys occupied by the glaciers. The earlier maps show the south end of Willard Island covered by ice, but as this seeming condition is very deceptive till one comes almost to the south end of the island,

and as the size and density of the vegetation on the island indicate a number of decades' growth, it is altogether probable that the ice has not been as far forward (north) as Willard Island within the time of which we have record, *i. e.* since 1794.

There is very good evidence, however, that at an earlier date, perhaps two centuries ago, the front of the Blackstone Glacier did extend well up to the north end of Willard Island. In figure 1 is shown the approximate position of this ancient ice front. North of the line indicated the island is heavily forested, but south of it by an abrupt change there are but sparse fir trees, though a dense growth of shrubbery has sprung up. On the west side of the island a small



FIG. 7.—Bare zone recently occupied by ice, small moraine, and forest (at the right) untouched by the last recorded advance of the Nellie Juan Glacier, August 8, 1908. The small summit to the right of the center of the photograph is Point A of Fig. 5.

gravel point marks the old terminal moraine. No precise location of the old front could be determined on the west side of the bay. On the east side of both island and bay is a very notable accumulation of morainal material extending out from the island and the mainland, joining under a shallow channel where tidal currents run very swiftly. The two points south of Point C in figure 1 may be modified remains of two recessional moraines. Although the island itself is very sparsely timbered south of the old ice front the gravel deposits on the east side of the bay are heavily timbered (Fig. 2). The development of sparse and dense forests in approximately the same

time is doubtless due to the more favorable conditions for forestation upon the gravel than on the bare glaciated rock of the island.

The photographs here reproduced as figures 3 and 4 were taken from the south end of Willard Island. They show the two discharging portions of the glacier. The scenery from this point is nearly as wild and desolate as that at the head of Harriman Fiord. From the west through the south to the east one views a vast ice field almost barren of nunataks stretching back to a brilliant white skyline. From the central mass deploys tongue after tongue of ice which either laps down over smooth rock slopes or breaks into the sea. It requires but little effort of the imagination to picture all these streams



FIG. 8—Detail of the small moraine shown in Fig. 7, August 8, 1908. Fragments of trees overwhelmed by the ice may be seen in the moraine. The trees at the right were not injured by the ice which built the moraine.

coalesced into one giant ice-stream filling the whole head of the bay and extending far down over Willard Island to the ancient moraine.

PORT NELLIE JUAN

Port Nellie Juan (Fig. 5), sometimes called Kings Bay after a prospector who had a cabin near its head, is the most extensive embayment on the west coast of Prince William Sound. We visited this port on August 8 and 9, 1908, but did not examine in detail the glaciers on its west side.

South of the central part, and east of the southern part of Port

Nellie Juan is a snowfield of unknown but considerable extent. Several glaciers flow north and west from this field, and two of them, the Nellie Juan and the Falling glaciers, reach tide water. On the west side of the southern part of the port are other glaciers, one of

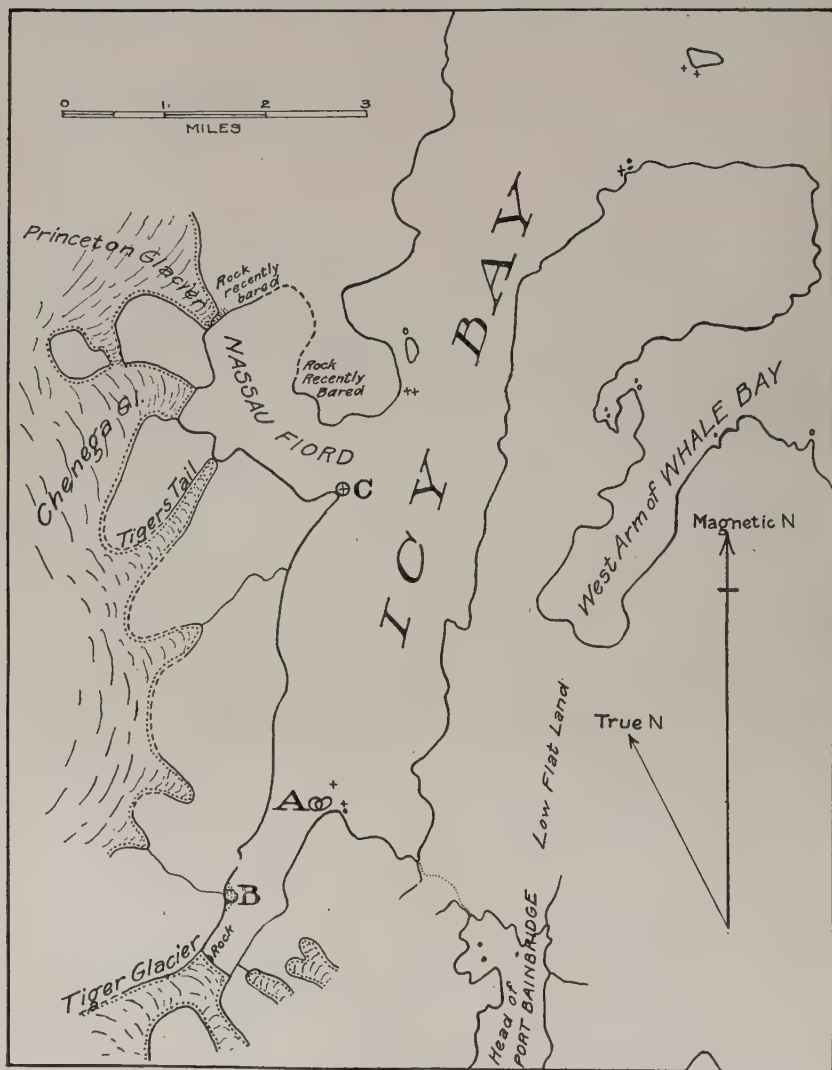


FIG. 9.—Map of Icy Bay, August 5, 1908. Photographs of the glaciers were taken from Points A, B, and C.

which, the Taylor, reaches sea-level. The head of Port Nellie Juan is shallow and the waters very muddy. This is due to streams from the adjoining glaciers, and especially to the fact that the two large

streams, Kings and Nellie Juan rivers, entering the head of the port, are charged with glacial silt. These streams come from one of the largest ice covered areas of the Kenai Peninsula.

ULTRAMARINE GLACIER

The Ultramarine Glacier, so named because of the clear blue color of the ice near its end, is situated at the head of Blue Fiord, the second (from the entrance) deep indentation in the southeastern coast of Port Nellie Juan. The glacier comes within about a quarter of a mile of tide water and the western part of the front extends farther forward than the eastern two-thirds and rests on a glacial



FIG. 10—Chenega and Princeton (on the right) Glaciers from Point C of Fig. 9, August 5, 1908.

flat. The eastern part of the front rests on a rock ridge about 300 feet above the sea. On this ridge there is a marked bare zone, and also one on the side of the glacier. The front of the glacier was not visited, but at a distance this bare zone appeared as if the ice had retreated from it in the last two or three years. Applegate's map indicates that the glacier in 1887 reached to tide water along its whole front. The forest in front of the eastern part of the glacier shows that this could not have been the case, although the western part may have reached tide water at that time, but even this is doubtful. Our observations on this glacier were made at a distance of about a mile and a half.

NELLIE JUAN GLACIER

The Nellie Juan Glacier (Figs 5 and 6) is the largest, at least in breadth of front, on Port Nellie Juan and is named after this port. The front of the glacier is distinctly in view from the entrance to the port, and rests on a gravel beach, most of which is covered by high tide; and near the center of the front the ice is bathed by low tide water. On both sides of the lower part of the glacier is a distinct bare zone of smoothed granite, and this bare zone, which is 100 to 500 feet in width, ends abruptly at the edge of a forest covered tract. This zone is prominently developed on a granite knob, almost



FIG. 11—Tiger Glacier from Point B of Fig. 9, August 5, 1908.

an island, at the west side of the glacial front. Crossing the top of this knob is a small moraine (at Point A on Fig. 5) from 1 to 10 feet in height and 5 to 30 feet in width. This moraine contains decaying fragments of trees, and just to the north of it is an area of scattering trees, some of which are a foot in diameter (see Figs. 7 and 8). To the south of the moraine is some vegetation,—moss, grass, alders 5 feet high, and a few spruce trees 4 feet high. Most of the vegetation disappears half way from the moraine to the ice front. From the extreme summit (Point A, Fig. 5) of the above granite knob the nearest point of the moraine is 48 feet distant in a direction

S. 10° W. From the same summit the extreme front of the glacier is 500 feet distant in a direction S. 13° W.

The moraine noted above marks the farthest advance of the ice since the growth of the present forest, *i. e.*, for a century, and most



FIG. 12—Map of the front of the Bainbridge Glacier, August 3, 1908.

probably for a few centuries. The date of this maximum historical advance is, at a minimum, twenty years, and probably the actual date is considerably longer ago than twenty years.

ICY BAY

No glaciers exist near tide water in Prince William Sound between Port Nellie Juan and Icy Bay (Fig. 9), which is a fiord in the southwestern part of Prince William Sound. Its axis runs northeast and southwest and the fiord is approximately 10 miles in length. This bay has been represented on the maps as about 4 miles in length with an east and west axis. It was not until after the United States Geological Survey reconnaissance of 1908 that the bay was delineated with approximate accuracy.* The reason for this lies in the fact that the later maps followed Vancouver's representation of this bay,



FIG. 13—Front of Bainbridge Glacier from Point A of Fig. 12, August 3, 1908. Point A is the top of the most southerly reef at the north side of the entrance to the shallow bay in which is the Bainbridge Glacier; this reef is covered by ordinary high tide.

and he reported† that the bay was “terminated by a compact body of ice that descended from high perpendicular cliffs to the water side.” At that date (1794) it is very probable that the glaciers in Nassau Fiord, the large bay on the northwest side of Icy Bay, completely filled that fiord and extended out into, but not across, the main part of Icy Bay. This, together with the extensive discharge of ice from these glaciers (combined as one), probably prevented close inspection of the bay and the discovery of its upper part.

* Grant, U. S., and Higgins, D. F. Copper mining and prospecting on Prince William Sound. *Bull. U. S. Geol. Survey* No. 379, 1909, pl. 4.

† Quoted by Davidson, George, *op. cit.*, pp. 23.

Our visit to Icy Bay was on Aug. 5, 1908, when we made a hasty reconnaissance of the bay, came within half a mile of the Tiger Glacier and obtained our information concerning the Chenega and Princeton glaciers from the rock islet (Point C on Fig. 9) at the entrance to Nassau Fiord. The following year Icy Bay was visited by the George W. Perkins' party, and the names here used are those proposed by that party with the exception of the name Chenega Gla-



FIG. 14.—Extreme north side of front of Bainbridge Glacier showing moraine, overturned trees, and forest partly killed by outwash gravels. August 3, 1908.

cier and the use of the name Princeton for the glacier immediately northeast of the Chenega. The Chenega is the main discharging glacier in Icy Bay and has long been known locally by that name.

CHENEGA AND PRINCETON GLACIERS

The Chenega and Princeton glaciers reach tide water at the head of Nassau Fiord (Fig. 9). The former glacier is discharging

abundantly and furnishes most of the floating ice so common in, and about the mouth of Icy Bay. From the top of a small rock island at the entrance to Nassau Fiord (Point C of Fig. 9) a good view may be had of both the Chenega and Princeton glaciers (Fig. 10); the extreme southern edge of the front of the former is not visible from this point. The rock surface about the entrance to Nassau Fiord has been recently glaciated and no forest has developed on it. It is undoubtedly true that the entrance to this fiord, as well as the peninsula at the north side of the entrance, were covered by ice within the last 100 years, and quite possibly within a much shorter period. The Indians living at the settlement of Chenega have a tradition that the Chenega Glacier reached to the mouth of Icy Bay about 100



FIG. 15—Southern part of front of Bainbridge Glacier from Point B of Fig. 12, August 3, 1908.

years ago. But the growth of the forest about the bay and even well up past the mouth of Nassau Fiord precludes this idea. The tradition more reasonably would refer to the mouth of the northern arm (Nassau Fiord) rather than to Icy Bay itself.

TIGER GLACIER

The Tiger Glacier reaches tide water at the extreme head of Icy Bay. The front of the glacier is steep and its eastern side was discharging in 1908 with fair rapidity. The western half of the front shows a ledge of rock just emerging from under the ice (Fig. 11). Evidently an advance will cover up this ledge and a retreat will make it more prominent.

BAINBRIDGE GLACIER

The Bainbridge Glacier is the only tide water glacier on the port of that name. A mile north of this glacier is a smaller one ending about 500 feet above sea-level. The Bainbridge Glacier does not appear on the earlier maps, although it is in view from ships passing Point Elrington. The first map known to us which shows this glacier is a small one published in 1906.* The glacier had, however, been known long before that date and the name Bainbridge is in common use locally. We saw the glacier from a distance in 1905, and on August 3, 1908, visited it and mapped its front (Fig. 12).

The Bainbridge Glacier ends on a glacial flat, and the central part of the front is reached by the usual high tide, and thus an ice cliff is developed along this portion of the front. This cliff is approximately 100 feet in height and its top is composed of ragged ice pinnacles, singularly free from débris and showing in the sunlight a beautiful play of greenish blue colors. Near the northern part of the ice front is a push moraine, 10 feet high, in places directly at the edge of the ice and in other places as much as 60 feet from the ice. This moraine is very fresh, and probably was formed during the summer of 1908. The moraine includes fragments of trees, and towards the north encroaches upon a spruce forest, many of whose trees have been killed recently by being partially buried in glacial outwash (Fig. 14). On the south side of the front (Fig. 15) there is a small irregular bare zone of rock between the ice and the forest.

The photographs here reproduced (Figs. 13, 14 and 15) will mark the position of the front of the Bainbridge Glacier on August 3, 1908, and will be of service in determining future advance or retreat. In 1908 the ice was practically, if not absolutely, at its maximum advance since the growth of the present forest.

* Grant, U. S., Copper and other mineral resources of Prince William Sound. *Bull. U. S. Geol. Survey* No. 284, 1906, p. 79.

LAND RELIEFS THAT ARE TRUE TO NATURE

BY

GEORGE CARROLL CURTIS

The earth sciences have at present scarcely any accurate models of land forms corresponding with our museum specimens of plants and animals, although such models could render great service to geology and geography. The "natural history specimen" in geography is evidently the actual land itself as it exists in the field, be it mountain, glacier, or other form of the Earth's surface. By rational procedure the magnitude of the natural form can be reduced, and the scaling down of the vast dimensions to a size that can be conceived at a glance, brings it within a compass which can best be appreciated by human senses. Thus the characteristic forms of topography may become comprehensible in their details to the inexperienced, and more thoroughly known by the specialist.

The naturalistic land model is a true reproduction of the existing outdoor form. It is both a true duplication as to surface and a faithful representation of the appearance and character of the object as it stands in the open. This implies that the model must reproduce, according to the scale of the work, not only the natural form of the land, but also represent the coloring and natural expression of the field as, under the time and conditions, it is depicted in the work. In theory, land models made on the naturalistic principle, *i. e.*, the reproduction of form and coloration as it exists, would reproduce the appearance of the natural phenomena taken; this is indeed the province and the test of the geographic model and its accuracy may be checked and proven by this comparison. This truthful reproduction may be called a picture in relief for it shows in three dimensions what photographs and paintings of topography present in two. It gives moreover not only the single view from one point which painting and photography supply, but vistas from an infinite number of positions as well. All topography in the field is much distorted by perspective, but the reduced model presents it in the least deflected presentation.

We have not been accustomed to see in our museums and laboratories, reliefs of land forms which afford true pictures of existing

landscape; yet that these may at least be approximated has been demonstrated in Europe by the Matterhorn model produced by Imfeldt of the Heim school and exhibited at Paris in 1900, and the Bora Bora coral island model produced in this country in 1907 and installed in the Agassiz Museum.

The advent of the naturalistic model during the past decade pre-sages a happy achievement for geography. It seems probable that it may hold for this study an interest similar to that which museum specimens of plants and animals have brought to biological subjects. It has the advantage of suggesting natural scenery, wears a convincing aspect of truth, and imparts a more comprehensive and exact idea of the thing represented than can be given in any other way. The full bearing of such advantage as the naturalistic land model may give is not yet recognized, yet its general use may give a distinct impetus to the specific understanding and teaching of earth sciences.

As the naturalistic model has a part so important and interesting, especially in Geography, in creating a broader interest and clearer understanding let us inquire why so valuable a means did not long ago come into common use and why museums and schools in general have not become familiar with such equipment.

In the modern, better understanding of geographic forms, to which the American geographers, Powell, Dutton, Russell, Gilbert and Davis have so much contributed, and in the perfecting of dry plate photography lie two of the most potent influences without which the art of reproducing the forms of the earth in relief could not have reached its present position, even though it has, as yet, scarcely crossed the threshold of its development. The "raising up" of maps into relief has been the common conventional procedure in land relief work, but the naturalistic motif aims to reproduce nature. Simple as is this distinction, there is a large difference in the data required, in the work necessary, and in the conception of the subject involved, and there is a corresponding dissimilarity in results. The naturalistic model approaches in truth the field itself with the advantage of comprehensible size. The first fine map of Switzerland, a country which has been foremost in such work, was made from a modelled relief of the land.

There are found in the raised maps or conventional representations, any kind of exaggeration the maker may wish to introduce for his special purpose. He may put in or eliminate what he chooses, change vertical and horizontal scales, print names and spangle with barbarous colors; this being consistent with the dia-

gram and the flat or the raised map. Not so with the naturalistic model; no such liberties can be taken; it is arbitrary and must reproduce the special place on the earth as it exists and appears. The purpose of this work is general not special, direct and exact not optional.



FIG. 1.—A Naturalistic Model of the Matterhorn. By Imfeldt. (Heim School) Switzerland.

In discussing the naturalistic model, it is not necessary to include the raised map, but as this, the most superficial expression of the subject, has constituted the bulk of the work, so that the prevailing ideas have been largely derived from it, a clearer understanding

may be had from a brief comparison of the two classes. When a recognition of the difference of principle is gained, it is seen that one product involves merely mechanical execution, while the other involves the application of principles of rational interpretation of natural phenomena themselves as guide to every phase of execution. There is a mechanical element in both scientific and artistic work which is ever likely to be confused with the principles which may create it. This detail is liable to seem the more obvious part and is frequently the first thing noticed while the principles which have guided the hand of a master and perhaps unconsciously produced the technique, though the essence of the matter, are often overlooked.

The mechanical details of writing a treatise on natural topography are no more its essential part than the mechanical details which go to build up an expressive topographic relief; in each they are but the means to accomplish an end. The French military service has a routing machine which turns flat maps into raised maps, but no machine except a reasoning one can reproduce the expressive surface of the earth in its characteristic appearances. It may be added that no one but a thorough portrait artist can adequately represent the human countenance, and that a competent geographical artist is requisite truthfully to reproduce the complicated natural surface of the lands. Some arts have more mechanical detail than others, as drawing more than writing and modelling more than drawing. The principles which must govern all rational work in land relief have been overlooked by many because of this profusion of mechanical detail required in their execution.

It may seem strange that a work which can present the forms of the earth in the truest possible way should as yet be so little understood. One consideration however is the peculiar position which it occupies; it is one of the "borderland" subjects, lying between the earth sciences on one hand and the landscape arts on the other. The artist who has today a geologic training is very rare, and the work involved in reproducing landscape in its natural three dimensions is so much greater than on a flat surface by painting, that landscape painters would not likely venture far into it; on the other hand, the modern earth scientist has rarely a sound training in the fine arts and is apt to be unreceptive of the requisite artistic appreciation which may reach the intuitive mind. Thus this broad subject involving the application of science and art, with a knowledge of geology, painting and sculpture, has lain in an unprogressive eddy between the busy streams of their activities.

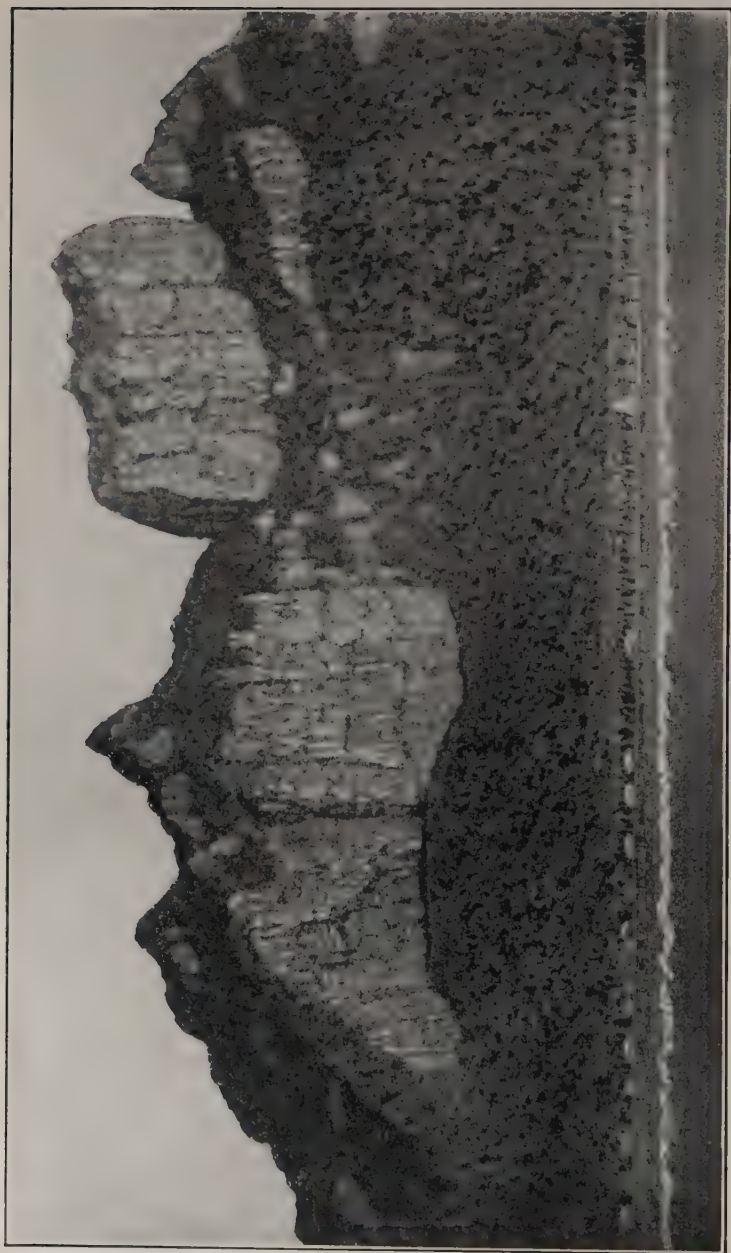


FIG. 2—Photograph of central portion Bora Bora Model. Showing central volcanic peaks, precipitous slopes crowded with tropic vegetation, narrow coastal plain with coconuts and native houses, sail in main lagoon. In foreground, sea breaking on the barrier coral reef.

It is the man with interests in both science and art who has helped most in advancing the subject of earth relief work. Albert Heim, leading geologist of Switzerland, artist by inclination and training, might be called the father of modern land relief modeling. In this country the geologist-artist combination produced the unequaled drawings of Western America topography of Prof. W. H. Holmes. Dr. R. T. McKenzie, a physician-artist, has added a new interest and knowledge to sculpture and anatomy in the naturalistic representation of the modern college athlete. In the naturalistic representation of animal and bird groups the artist-naturalists of the American Museum of Natural History, have brought a new and vivid presentation of the life and habitat of American fauna which has drawn a broader interest than museums of natural history have before been able to attract.

The past recalls as men of the artist-scientist type, Leonardo da Vinci, John Ruskin, Charles Eliot and Augustus Saint-Gaudens.

A comparison of the processes of making a raised map and a naturalistic land model should help those who are accustomed to consider a topographic relief as a matter of process and mechanical method alone, and not of principle, (the rational interpretation of natural earth phenomena in relief), to see the wide difference in procedure.

In 1904, Alexander Agassiz decided to have reproduced in relief, the coral island Bora Bora of the Society Archipelago.* The model was to reproduce the surface of the island as it exists in form, color and appearance, *i. e.*, it was to be "naturalistic." Fairly good maps made by the French Government were at hand and these gave sufficient data to prepare a raised map which indeed might have been forthwith constructed, and results similar to those of the common kind of work speedily turned out. It was recognized that such a procedure would give not more but less truth than was already possessed, and if a true model were to be made, the necessary data for it must be procured. This little coral island was visited, two months of field work were spent upon it, and all the data requisite to reproduce both form and color of the natural field were collected. The work included a complete photographic survey, covering every point of the surface from at least two separate stations. The data collected were brought back and incorporated into a relief (about 100 square feet in area). When views of the modeling, duplicated

* This island was chosen by Darwin ("Structure and Distribution of Coral Reefs," p. 3) to illustrate the type of high island with volcanic center surrounded by coral reef and inclosing a vegetation covered land rim.

those made in the field from identical points, the sculpturing of the land forms was regarded as finished.

Duplicating the forms did not complete the naturalistic representation of the island. The coloration of rocks, bare and grassy slopes, trees and other vegetation, roads, beaches, reefs, etc., had been taken, and an attempt was made to carry out a naturalistic system of coloring which should give the season, time, and general conditions represented, in accordance with the recognized laws of color and principles of art. The entire face of the land was modeled as a portrait statue of the human figure would be produced by a figure sculpture. Several specially trained workers were placed on the purely mechanical parts, the construction taking over a year of steady labor.

A raised map of the same size and scale of the ordinary standard could have been completed in seven weeks, and without other aid than unskilled labor. A slab of plaster with the contour lines of the map drawn upon it, could have been cut down by a routing machine, the signs of the map painted upon the resulting relief, and the raised map would be complete. Inadequate as works from such a basis are and appear to be when such principles are applied to other natural objects than the forms of the lands, they nevertheless have been in common use as geographic reliefs.

That the more rational methods used in the coral island work* should produce a different class of work and a product quite dissimilar in appearance, was to be expected. At first glance a casual observer would mark a difference. People who had never seen a naturalistic land model were surprised to discover a topographic relief that gave the appearance of something they had seen out of doors. When they compared the modeled forms with photographs of the field, they saw that the artistically made shapes were like the natural features and being first attracted by the appearance of naturalness, then interested by the accuracy proven, they became impressed with the truth of the model finding in it reliability that had not hitherto been expected from this medium of earth representation. A glance at the naturalistic work gave even to Professor Agassiz a more complete understanding of the island than was before possible and to all who had never seen a coral atoll, the model gave the best opportunity for seeing what it is. The value of the naturalistic model to Geology, Geography and Museums of Natural History was demonstrated and those who gave it thought saw how

* The paucity of naturalistic land reliefs on exhibition in this country makes this reference necessary.

much clearer and more specific our preceptions of the forms of the earth will be when eventually we have its principal types reproduced in true naturalistic models.

If our museums and collections had never possessed naturalistic specimens of plants and animals, what would be our perception of the fauna and flora of the world? The naturalistic land model is to Geography what the natural animal specimen is to Zoölogy, and it has even a greater service, for outside the museum we may view many animals at close range, but the types of land forms are so vast that in the field our limits of vision will permit the examination of but a small part at a time.

The development of the art of land representation in relief has been retarded by the peculiar conditions surrounding it. The art of earth sculpture is akin to that of figure sculpture, both of which are parts of a large subject, including the representation in relief, of the earth and its forms both organic and inorganic. The division of the inorganic which includes the sculpture of the lands, is subject to the same laws as that of the organic which includes the human figure and the sculpturing of animals. Again, the reproduction of portions of the Earth's surface, forms and coloration in relief, is a representation of the same landscapes in three dimensions which painters represent with colors and canvas in two dimensions. The same general laws of science and art apply to reliefs of the land as to the sculpturing of the human figure, and the painting of natural landscapes. That each portion of the land's surface gives a definite problem in natural history whose proper solution in relief must be obtained through consistently following the development of science and laws of art appears to have been largely overlooked.

To understand the principles of earth sculpture one must be familiar with the earth science on which it depends as the figure sculptor must know human anatomy the basis of figure reproduction; moreover as successful painting and sculpture are guided by the laws and rules of good art, so a knowledge of these same rules and laws must guide the understanding and practice of the art of representing the lands in relief. It is a subject with a dual basis of art and science. As with Paleobotany both geology and botany must be studied, so in topographic modeling adequate work or criticism must be based on the fine arts as well as earth science. While this combination has been quite rare in individuals, in groups whether of artists on the one hand or scientists on the other it has been wholly wanting, and little or no concerted action to forward this work has been taken. Artists being largely unacquainted with

the scientific aspect have passed it by, and the average man in earth science had small interest in the artistic basis.

What development the work of faithful reproduction of the forms of our Earth has attained has come mostly through the support of men with interests on both sides of the dual subject, men of both scientific training and artistic appreciation. Among those engaged in earth science in Europe, Heim and his pupil Imfeldt of Zürich, and Schrader of Paris have done most by their own work while in America, Agassiz, McKim, Saint-Gaudens, Burnham and Olmsted, men of both scientific and artistic training, have, from the point of view of dual relation, recognized the unequalled value of the naturalistic land model to aid in their special activities and have lent support and encouragement to its promotion. When we realize that until within the last five years, there have been in American institutions (with the possible exception of some small idealistic reliefs by Prof. Heim) few if any naturalistic topographic models, it is not strange that there are still men eminent in the earth sciences, who do not yet clearly distinguish between the principle of the naturalistic land model and the raised map.

In the interest of more specific and wide spread appreciation of geographic forms and types, it is unfortunate that the smaller side of the broad subject of earth sculpture has alone been generally recognized. An impression that process, addition or suppression of mechanical details is all there can be in the subject has been widely spread. One conversant with art in any form, be it in letters, music, painting or other means of expressing natural truth, may see the fallacy of such a conception, for in all arts which interpret nature, method is but a means to accomplish a purpose.

When a master sculptor chisels the human form, his knowledge and fine perception of the subject show in the handiwork, they guide the mechanical steps of execution and may produce even without design, a certain technique; these cuttings, skillful contrivances, humps, hollows and processes are not in themselves the important part, but merely the mediums through which ideas are expressed.

No mechanic who can see only the details and processes of construction, (these must always differ according to the infinitely varied problems which natural topography and scenery present), has the knowledge and perception to ever produce a good piece of naturalistic art of whatsoever sort, lacking as he does the ability to see that which the well trained mind of the artist grasps as essential. Nor can the scientist untrained and unversed in artistry rightly expect to achieve successful results in this medium of naturalistic

expression. To accept as adequate in earth sculpture results that would be universally unacceptable in figure sculpture is inconsistent with the aspect of the surface of our planet as it appears to men of scientific training and vision. To produce results in land modeling equal to those of good figure sculpture, it is necessary to employ knowledge, training and perception of comparable quality.

One of the first functions of the naturalistic geographical model is to correct the false impressions of slope and relief which most of the old raised maps have given us. Many leading teachers today seem unable to recognize truthfully modeled land slopes when they are so represented, holding from old association that they must be too steep or very inexact. As yet, largely for lack of true models, they have not become accustomed to expect in earth reliefs reliability and true reproduction of natural form. Gradually the naturalistic model may rectify false impressions; and the doubting spectator, by comparing the model with photographs of the field can satisfy himself of the reliability of the medium.

Without such reliefs the teacher of Geography lacks the most comprehensive, truthful and convincing means of conveying the facts of earth forms.*

A far wider and keener interest will be attracted to the earth sciences as a logical result of applying to the intricate forms of natural landscape, the same degree of knowledge, study and training that is already applied to the well-known naturalistic arts.

Until our museums possess naturalistic specimens of existing types of land forms a most important work and duty in the earth sciences will remain undone and we shall be without the most complete and effective means known for presenting the great features of Geography with their splendid forms of mountain scenery and various types of landscape.

* As yet naturalistic geographical models have not been commonly adopted in schools, though their possible service in imparting a vital and truthful interest to the study is probably enormous. Teachers have not yet been trained in their use and value, and it is only within the past few years that such apparatus has been placed within reach of the common schools.

THE ECONOMIC CLIMATOLOGY OF THE COFFEE DISTRICT OF SÃO PAULO, BRAZIL

BY

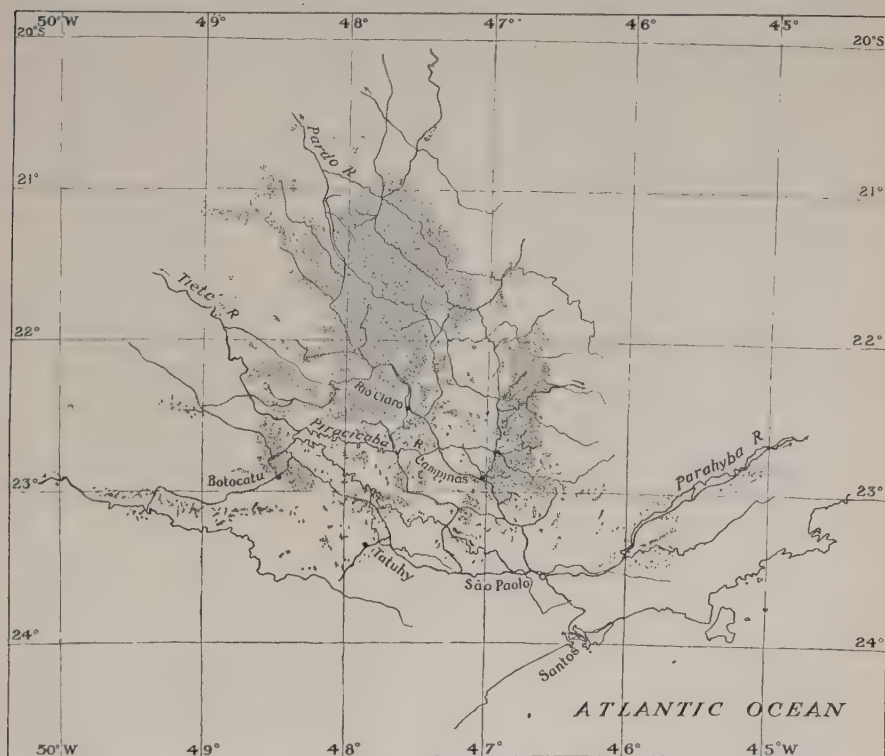
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NEED OF "FIELD WORK" IN CLIMATOLOGY: The teacher of climatology, no less than the teacher of geology or of physiography, should travel. He should do "field work." If he is to have a clear understanding of the climates of the world he cannot be satisfied with the published numerical data, no matter how accurate these may be, or how carefully they have been discussed. He will, in addition, want to visit as many parts of the world as possible, in order that he may himself become familiar with the various weather types. In this way, and in no other, can climatic description become really alive, and can the teacher of climatology do his best work for his classes. The natural objection, that it is impossible for one person to make any adequate "field study" of this sort, because of the immense number of different weather types the world over, is a valid one to a certain degree, but it should be remembered that in many latitudes the weather conditions are so uniform, day after day, that a day or two spent there suffices to give a very fair idea of the climate. In the heart of the trade wind belt, at sea, a day's weather and the climate are thus nearly identical. And in many districts, especially within the tropics, where there are two well-marked seasons, a day or two in each of these seasons often suffices to give a reasonably good idea of the character of the whole year.

To the practical climatologist, who concerns himself with applied, rather than with purely theoretical climatology, this "field study" of climate is obviously of peculiar interest in a locality where the climatic conditions are of special importance to man, because of their relation to some particular crop, or to some industry, or to health. There is thus a natural difference in interest in the economic climatology of different regions. For various reasons the writer has lately had his attention drawn to the immense importance of the Brazilian coffee crop. This paper deals with certain climatic aspects of coffee cultivation and of preparation for market which presented themselves during a recent summer trip to Brazil, which was undertaken in order to make first-hand observations of the economic climatology of the Brazilian coffee district.

DISTRIBUTION OF COFFEE OVER THE WORLD: The coffee belt of the world roughly corresponds—conveniently for our memories—with the broad zone within the Tropics, although latitudes 23.5° N. and S. are not to be thought of as rigidly limiting the countries in which coffee grows. The extreme limits of *Coffea Arabica* are generally given as 28° N. and 30° S. Within this great area there are differences of rainfall, both as to amounts and season of occurrence; of temperature; of exposure; of altitude; of soil. It is, therefore,



Map of the Coffee District in the State of São Paulo, Brazil. Scale 1:5,500,000. Stippled areas represent coffee districts. "São Paulo" should read "São Paulo." Based on a map published in 1907 by the Comissão Geográfica e Geológica de São Paulo, scale 1:2,000,000.

impossible to give any rigid climatic limitations for coffee culture, or to draw a map which shall indicate the climates where coffee might be profitably cultivated, valuable as such a map would obviously be to the economic climatologist. Fortunately for man, *Coffea Arabica* is not nearly so exacting in regard to its climatic requirements as are many other tropical plants of economic importance. It does well on lowlands near the equator, and it also does well at altitudes of 2,000 feet near the margins of the tropical belt. By far

the greater part of the world's coffee crop, however, comes, not from the middle of the belt, near the equator, but from the hill-slopes or plateaus some few hundreds of feet above sea-level near the "temperate zones." In other words, coffee succeeds best in the more temperate climates of the tropical zone, in just those climates which are best suited to Europeans and North Americans. To-day, coffee comes chiefly from the New World, and from south of the equator. Temperatures fairly high and uniform (monthly means of 60° or 65° to 75° or 80° Fahr.), and rainfall in reasonable amount (*i. e.*, higher than that of most of the "temperate zones"), say 60 inches and over, are generally found. Excessive humidity is injurious because of its effect upon the diseases of the coffee plant, and upon the growth of weeds, although otherwise a high relative humidity is beneficial.

Naturally, the different species of coffee differ greatly in their relation to climate, some doing better at higher elevations, and others at lower; some withstanding drought better, and others thriving only where there is a more even distribution of rainfall; some being more and others less resistant to cold. The distribution of rainfall is an important factor, a dry season during harvest-time being a very desirable feature, especially where sun-drying is practised. The dry winter season of Brazil is worth millions of dollars to the coffee-planters of that country. In general, climates which are very hot and very damp are somewhat less favorable than those which have a relatively dry season during certain months.

THE BRAZILIAN COFFEE DISTRICT: Among all the coffee-producing countries of the world, Brazil stands pre-eminent. She is the colossus. She alone sends out annually about three-quarters of the world's total coffee crop. No reading of books on coffee can give any adequate idea of the extraordinary position which coffee occupies in the world's commerce. To appreciate this remarkable situation one must travel for hour after hour through the rich coffee plantations of Brazil; must live in their midst, and must make a study of the methods of planting, cultivating, harvesting and preparing the coffee for market, including the wonderfully ingenious machinery which has been invented to deal with this one particular crop. The coffee district of Brazil is situated in the highland or plateau region to the south and west of the city of Rio de Janeiro, chiefly in the state of São Paulo (latitudes 20°-25° S., longitudes 44°-53° W.), although the adjacent states of Minas Geraes, Espírito Santo and Rio de Janeiro are also coffee producers. This "Brazilian Highland," so-called, is the great table-land of central and southern

Brazil, averaging about 2,000 to 3,000 feet above sea-level; sloping gently inland and westward; falling off abruptly to the sea on the east. Open campos and scattering woodlands occupy the greater part of its surface. The eastern portion is mountainous, the most marked feature being the sea-coast mountain ranges of the Serra do Mar and the Serra do Mantiqueira. The western portion belongs to the basin of the Parana River, and is crossed by several small mountain ranges, roughly parallel to the Serra do Mar. The coffee country *par excellence* is a gently-rolling district a little south of the Tropic of Capricorn.

The importance of the Brazilian coffee crop in the world's markets naturally draws attention to the particular small section of that great republic in which the conditions have proved so favorable for the cultivation and preparation of this remarkable plant. Those who have travelled for hours through those oceans of coffee trees need no further assurance that this is the center of the world's coffee crop. Nowhere else in the world does coffee grow more luxuriantly; nowhere else does it find a more congenial climate; nowhere else does it require less care; nowhere else is it more free from enemies. Such a condition of things is unique; it is phenomenal; it irresistibly attracts the traveler. He is drawn to it as he is drawn to visit the world's greatest diamond mine, or steel plant, or ship-yard, or waterfall. It matters little in such a country whether there are (as statistics say) over 15,000 coffee plantations. It matters little whether there are 600,000,000 or 700,000,000 coffee trees. It matters little whether the invested capital is \$500,000,000, or more, or less. It matters little, because figures mean little to most of us, and because the vastness, and the extent, and the importance of the coffee industry are here so obvious without any statistics.

The most natural way for a visitor from the United States to enter the Brazilian coffee country is to land at Rio de Janeiro, and to travel thence by train to the city of São Paulo, a distance of about 300 miles to the southwest. This trip, through the Parahyba Valley, dusty as it is in winter, and monotonous, is nevertheless interesting from the fact that here used to be the centre of coffee culture. The coffee tree was first introduced into the city of Rio de Janeiro about 1750 by a monk, who planted it in the garden of the monastery of San Antonio. Early in the last century the cultivation of coffee became recognized as a profitable occupation, and gradually the hill-sides of the state of Rio de Janeiro, especially in the Parahyba Valley, became covered with coffee trees. The crop was so successful that it helped greatly to give Rio its prestige as a commercial centre,

just as, in recent years, coffee has been the chief impetus behind the extraordinary development of the cities of São Paulo and Santos, and has led to the building of most of the railroads in the state of São Paulo. The traveler between Rio and São Paulo may today see from the train many abandoned coffee plantations, dry and dead, whose owners became wealthy men, but whose manor-houses and outbuildings are falling into ruins. In fact, much of this country today looks forlorn and neglected. Whoever looks at these barren hillsides, especially in winter, is easily tempted to infer that a change of climate has made coffee-culture in this district impossible. Such is not the case. The fact is that coffee has been found to succeed so much better in the state of São Paulo, that it no longer pays to keep up most of these old plantations in the state of Rio de Janeiro. Exhaustion of the soil; the development of new railroads in the country farther south; and other factors have combined to produce the change here noted. Nevertheless, coffee culture has not been entirely abandoned in this district. The traveler may still see thriving plantations here and there from the train. But sugar cane and other crops are taking the lead. In this district the first experience in Brazilian coffee culture was gained. Interesting studies were here made as to the value of longer and shorter exposure to sunshine. A classification into *soalheiro* and *norwega*-lands separated the slopes into those which had the longest duration of sunshine (*soalheiro*) and those which had sunshine only in the early morning (*norwegas*). Many local peculiarities of climate were discovered by the early coffee planters of the Parahyba Valley. Certain districts which were protected against cool winds were found to require coffee culture at greater altitudes. In some districts dry northerly winds were found to be injurious, while in others they were welcomed. Van Delden Laërne has called attention to many of these very interesting local climatic controls over coffee culture in this Rio zone, but the day has passed for any further detailed studies along these lines, for the Rio coffee belt is largely no more. Van Delden Laërne, in 1885, divided the coffee country into two zones, (1) the Rio or maritime zone, where the climate is to some extent controlled by the ocean and where coffee must be cultivated at from 250 to 350 meters above sea-level, and (2) the Santos zone, to the west and southwest, separated from the ocean by the Serra do Mar, and open to the southwest winds (*pamperos*) from the Argentine plains. The same writer rejects the division suggested by Couty, into a section where the soil is the chief control and into one where climate is the only measure of success.

The São Paulo coffee district is easily reached in a day's journey by rail from the city of São Paulo, along any one of the several lines of railway which run in a northerly and northwesterly direction from the city. Campinas (alt. 2,165 ft., 84.5 miles from the sea) was formerly the center of the best coffee plantations, but in recent years the rapid extension of the area inland and northward has displaced the center further to the northwest. In the vicinity of Campinas, however, there is still much coffee, and the traveler from São Paulo here sees his first large coffee plantations. From here on it is a journey of wonderful interest to any observing person, in spite of the red dust which in winter is very disagreeable, although the ballasting of some of the railroads with stone has recently greatly improved matters. Coffee trees are everywhere; coffee trees by the hundreds of thousands; coffee trees by the million. Monotonous the view is, if you will. To many it has seemed so. But to anyone who really enters into the spirit of the place the monotony becomes variety. It is inspiring to be at the very heart of this country whose product is so valuable that it has made, and will make fortunes; that its varying prices are quoted in the daily papers all over the civilized world; that a national government has actually gone into the business of "cornering" it.

Many factors are concerned in producing the extraordinarily favorable conditions which have made this small part of Brazil the most important coffee country in the world. Among these are soil, altitude, exposure, absence of many insect pests and diseases. One fundamental control is, however, to be found in the climate. It is because of its relation to coffee culture that the climate of the state of São Paulo has such a live interest for the climatologist, an interest which is not satisfied with any published studies of this climate. Such an interest compels a personal visit to this wonderful coffee country itself in order that the actual weather conditions may be seen and felt; so that their control over the cultivation and preparation of the coffee may be studied on the ground. Such was the object of the writer in making a trip to Brazil in the summer of 1910: to make some observations, at first hand, of the economic climatology of the coffee-district of São Paulo. Through the courtesy of Dr. Plinio Da Silva Prado (Harvard, '95), of São Paulo, he was enabled to visit two well-known and representative Brazilian coffee fazendas, that of Santa Veridiana, belonging to Conselheiro Antonio Prado, with 500,000 trees, and that of Santa Cruz, at Elihu Root, belonging to the Chaves family, with 450,000 trees. The latter was selected as the fazenda to be visited by Secretary (now Senator) Root during his South American trip, and the railroad station was then renamed

in his honor. At both these fazendas the writer was entertained with delightful hospitality, and was given every facility to study each step in the process of cultivating the coffee and of preparing it for market.

THE CLIMATE: Fortunately for the layman, the essential characteristics of the climatology of São Paulo are simple and easily remembered. Fortunately for the climatologist, São Paulo has a very considerable series of excellent meteorological observations, which were begun in 1887 under the direction of Dr. Orville A. Derby, of the *Commissão Geográfica e Geológica de São Paulo*, and constitute the most complete series available for any part of Brazil, or for any portion of tropical South America. To Dr. E. L. Voss we owe a very acceptable study and summary of these data, and it is to Dr. Voss's monograph that everyone must go for the most complete account of São Paulo climate ("Beiträge zur Klimatologie der südlichen Staaten von Brasilien; *Pet. Mitt., Ergänzungsheft* 145, Gotha, 1903), although the excellent summary in Hann's "Handbuch der Klimatologie" 3d ed., Vol. IIa pp. 392, 394, 411-413, will probably suffice for most persons.

Singularly favorable as regards climate is the situation of the famous São Paulo coffee district. And it is clearly this favorable, we may say ideal, situation which has contributed largely towards making the district famous for its coffee. Lying near the margin of the southeast trade belt, it is not too far from the equator to be reached by the equatorial rains in the summer, and a sufficient rainfall is thus assured for the proper growth of the coffee trees. On the other hand, the prevalence of the trades during the winter months brings the dry season which is of such immense economic importance in the harvesting and drying of the crop. Further, being near the outer limits of the "hot belt," and at an altitude of several hundred feet above sea-level, the heat is not so intense as to necessitate any protection against the sun except in the case of the very young trees. On the other hand, the danger from frost, which is certainly present in winter, has been greatly exaggerated by many writers. Frosts do occur, but it is only at intervals of several years (say six or seven) that they rarely do any damage which is worth much consideration. Finally, as regards relative humidity, the conditions are such that the air is dry enough for outdoor drying in winter, and not so damp as to promote the excessive growth of weeds in summer. Such a combination of climatic conditions is indeed an ideal one. There are few districts in the world whose economic climatology is more important. A visit to such a country is of the greatest interest to the climatologist.

The accompanying table (Table A) gives a general idea, so far as printed data can do so, of the temperatures of the São Paulo coffee district. Of the five stations here included, Rio Claro, Campinas and Botucatú are the best representatives. The city of São Paulo itself is not in the coffee country. The three first-named stations agree in having six (or seven) months with mean temperatures over 68° Fahr. For this reason, this famous coffee country comes within Köppen's "subtropical belt of the temperate zone," whose characteristics are that four to eleven months are "hot" (mean temperature over 68°) and one to eight months are "temperate" (50°-68°).^{*} The mean annual temperatures average between 65° and 70°. January is usually the warmest month and June the coolest. The ranges, annual, monthly and diurnal, as a rule increase inland. The mean annual ranges in the coffee country average from 12° to 15°. In summer the thermometer may rise to near, or even above, 100°. The extremes of summer heat are brought by northwesterly winds, from the interior, which are also extremely disagreeable because of their carrying large quantities of fine red dust. We have a story, on excellent authority, which illustrates the intensity of the summer heat in the coffee country. During a spell of intense heat, and drought, when everything was "sizzling hot," a large snake which started to crawl across an iron surface, was seen to die almost instantly.

TABLE A

TEMPERATURES IN THE SÃO PAULO COFFEE DISTRICT (HANN)

STATION	SÃO PAULO	TATUHY	RIO CLARO	CAMPINAS	BOTUCATÚ
S. Lat.....	23°33'	23°27'	22°25'	22°58'	22°50'
W. Long.....	46°38'	47°46'	47°39'	47° 7'	48°25'
Altitude.....	2493 ft.	1968.5 ft.	2000 ft.	2165 ft.	2625 ft.
No. of Years.....	13	12	11	10	5
Dist. from Ocean (miles)	32.3	84.5	128	84.5	134.2
Jan.....	71.1°	73.2°	75.6°	73.2°	72.7° ^a
Feb.....	70.7°	72.3°	74.7°	72.5°	72.1°
Mar.....	70.0°	71.8°	74.3°	72.1°	71.6°
Apr.....	65.7°	66.4°	70.2°	68.0°	66.9°
May.....	61.2°	61.9°	64.9°	63.3°	61.9°
June.....	57.9°	58.3°	61.5°	60.4°	58.5°
July.....	57.6°	58.7°	61.9°	60.6°	60.1°
Aug.....	60.1°	61.7°	65.7°	64.2°	63.7°
Sept.....	61.9°	63.0°	67.6°	65.3°	65.1°
Oct.....	64.6°	67.1°	71.1°	68.2°	68.9°
Nov.....	66.7°	69.8°	72.7°	70.0°	71.1°
Dec.....	70.0°	73.0°	74.8°	72.7°	73.8°
Mean Annual.....	64.8°	66.4°	69.6°	67.6°	67.3°
Mean Annual Range..	13.5°	15.0°	14.0°	12.8°	15.3°
Absolute Maximum...	91.6°	(108.5°)	(97.3°)	(98.1°)	(100.0°)
Absolute Minimum...	35.2°	(28.8°)	(28.8°)	(31.6°)	(32.0°)

N. B. The maximum and minimum given for São Paulo are mean annual maximum and minimum.

^{*} See R. DeC. Ward: "Climate," pp. 28-29.

Obviously, the summer months, with their high temperatures and heavy rains, are not the best season for visiting the coffee district. We must go there in winter if we would enjoy the climate at its best. A glance at the table shows that the winter months have mean temperatures of, roughly, between 60° and 65° , and that the minima have fallen to freezing, and somewhat below. But what does that really tell us about the winter weather types—those wonderful days, of which the writer has seen many, on the campos of southern São Paulo and of Paraná in 1908 and in the coffee district in 1910, with their cool, crisp, sparkling air of early morning; their warm noon hours, their refreshing evenings, and their gloriously clear skies? No wonder is it that Europeans have settled so largely in the southern states of Brazil, for the climate is a "white man's climate." During his stay at the coffee fazendas in August, 1910, the writer found the temperatures of the early mornings (about 7 A. M.) between about 50° and 60° , or a few degrees over 60° ; in the warmest hours of the day it was between 80° and 82° ; and in the early evening (6-7 P. M.) about 75° . These are ideal conditions for health and pleasure in the dry air of the winter months.* Add to such temperatures a sky which is prevailingly cloudless or has only scattering clouds; and a light wind, and you have a combination of elements which should satisfy all but the most exacting seeker after a congenial climate.

The writer obtained temperatures of 55° - 60° in the city of São Paulo in August, 1910, in the morning and evening, and 70° - 75° in the early afternoon. The weather was clear or cloudless all the time, and the wind light S. E. The prevailing direction of the winds (the southeast trades) is very generally indicated by the unsymmetrical growth of many trees which often serve, here as elsewhere, as excellent wind vanes. Local topography frequently deflects the trades into other directions than southeast, over limited areas, as the writer has had occasion to observe. The general southeasterly winds weaken in summer, under the high sun, following the usual law in these latitudes, and are replaced by hot winds from the northwest. The latter are especially marked in the interior, where they are so distinct that Voss has called them the northwest monsoon. It is these summer winds, or calms, which bring the rains. Following the wind changes, the relative humidity is usually higher in summer and lower in winter, although near the ocean, where the trades are both cooler and damper than in the interior, the humidity is high through the year, and showers are not uncommon even in winter. It is asserted

* In the writer's note book, Aug. 13, 1910, there is this entry: "For a teacher of climatology a journey of 10,000 miles for one such day is well worth while."

by Voss that rivers, swamps and forests locally increase the humidity, but that the coffee plantations have no such effect. Cloudiness is at a maximum in January and February in the interior, and at a minimum in July and August, following the seasonal changes in general weather conditions.

The rainfall over the coffee district averages between about 45 and 60 inches. The rainfall of the coast is generally a good deal heavier than that of the interior on account of the free exposure of the former, with its mountain ranges, to the easterly trade winds. Santos, on the coast, at sea-level, has about 90 inches, while the annual mean at Alto da Serra (2,625 feet), the highest point on the line between Santos and São Paulo (city), is 145.55 inches. São Paulo itself has just over 50 inches. The coffee district is therefore plentifully watered, a fact which not only greatly facilitates the harvesting and preparation of the coffee, but also provides a certain amount of river transportation. The general conditions of rainfall for this region are illustrated in the data given in Table B for three representative stations. This distribution of rainfall furnishes a good illustration of the so-called "tropical type," which is found at the margins of the trades, where the equatorial rain belt encroaches, in the summer months, upon the trade wind area. January is usually the rainiest and July the driest month, but even the so-called "dry season" has some precipitation. The rain probability is also greatest and least in these same months. By seasons the probability of rain at Rio Claro and at Campinas is as follows:

	SUMMER	AUTUMN	WINTER	SPRING
Rio Claro.....	51	25	13	32
Campinas.....	57	28	16	35

In the interior, the hours from 2 to 4 P. M. are on the whole the rainiest. Heavy thunderstorms, not infrequently accompanied by hail, occur in summer. The hail may seriously injure the coffee trees, even, as some authors have said, "almost totally destroying whole plantations." The present writer was, however, unable to discover that damage by hail is really much feared by the fazendeiros,

TABLE B

MONTHLY RAINFALLS IN THE COFFEE DISTRICT (VOSS)
(in inches, to nearest hundredth)

STATION	YEARS	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY
Campinas..	10	7.13	10.87	8.74	7.48	2.79	2.72	2.16	0.71
Rio Claro..	11	7.01	9.21	8.07	5.47	2.60	2.24	1.97	0.43
Botucatu..	3	3.42	9.25	7.60	7.36	1.73	1.77	2.01	0.59
		AUG.	SEPT.	OCT.	NOV.	YEAR			
Campinas..		1.34	3.23	5.59	6.46	59.72			
Rio Claro..		1.18	3.46	4.68	7.01	53.78			
Botucatu..		0.47	1.77	5.00	5.00	46.30			

and he could find no case of hail insurance. As the *administrador* of one coffee fazenda said, "the hail falls in such narrow belts that I am not afraid of its doing much damage." And that seems to be the general opinion. That the hail-storms of the campos of *southern* Brazil may be very severe the writer had occasion to observe in 1908 when crossing the state of Paraná, and it may well be that even in the coffee district men and animals are sometimes injured, as reported by some writers. One economic aspect of heavy rainfalls in this country is their effect in washing the roads, which are none of the best even in the dry season, and making travel, even in the famous Brazilian "trolley" (a kind of rude buckboard) difficult. Nocturnal radiation fogs are very common, especially in winter, in the valleys and on the lower slopes of the hills. No traveler who is obliged to be up early in order to take the morning trains, which very commonly start at about 6 A. M., can fail to note the frequent occurrence of these fogs. Fogs, and heavy dews, are doubtless a very effective aid in providing moisture for vegetation at a time when such moisture is most needed. The writer, during his recent trip, made special note of the occurrence of fogs and of very heavy dews. The former doubtless often serve as a protection against frost, while the latter may be injurious to coffee which is spread out on the drying-grounds, unless coverings are used at night.

SOIL: It must not be supposed that no emphasis is to be laid upon the soil of the São Paulo coffee district in helping to produce the wonderfully favorable conditions of that region. In the older, or eastern coffee belt of Rio de Janeiro and of eastern São Paulo the soil is decomposed granite and gneiss of Archaean age. But the interior of São Paulo is composed chiefly of sandstones and shales of Devonian and Carboniferous age, traversed by numerous dikes and intrusive masses of diorite and other eruptives. It is the decomposition of the latter which produces the rich red soil that has become famous as the *terra rossa* and is regarded as the best for coffee culture, being wonderfully fertile, very rich in potash, and containing much iron. The *terra rossa* lands are the most valuable and most keenly desired by coffee planters. They are adapted for the growth of coffee as no other soils seem to be, and the term has become almost synonymous with "a soil suitable for coffee planting." For various modifications of this soil the terms *terra vermelha* and *terra massapé* are used. The sandstones yield *terra areia* (sandy soil) which is further classified as *preta* (black), or *branca*, (grey), etc. But the red soil is by far the best, and is justly famous where-

ever coffee cultivation is discussed. The traveler very soon learns to predict his approach to a coffee plantation simply by noting the occurrence of red soil, seen from the window of the train.

SOME CONTROLS OF CLIMATE OVER COFFEE CULTIVATION: We have, then, in the state of São Paulo, a rare combination of elements singularly favorable to coffee culture. Favorable as these conditions have shown themselves to be, man has, nevertheless, been obliged to adapt his methods of cultivation and his methods of preparation to the climate in a number of rather striking ways. The climatic control is to be seen throughout, if one is only on the watch for it. Exactly such facts as these are what the economic climatologist is interested in: it is in order to see them that he is anxious to do "field-work," instead of remaining at his desk at home. Thus, at the very beginning of the plantation, when the virgin forest which still covers the hillsides of the future coffee fazenda is first attacked, the trees are cut down at the end of the rains, and are allowed to dry during the winter months. Towards the close of the dry season, when trees and shrubs are in their best condition for burning, the fires are set, and the whole mass of tangled vegetation is wiped out, excepting perhaps a few tall, dead trunks, which stand for years, silent witnesses to the departed glory of the forest and to its replacement by a growth of trees from which man derives greater economic advantage. This burning, it may be noted, is begun by preference after the night's dew has evaporated. During the dry season there are many field and forest fires in progress throughout this great interior campo country of Brazil, but fire is not feared among the coffee trees, because they are separated from one another and because the roads through the plantation make the control of fire an easy thing. Towards the latter part of the winter, when vegetation is thoroughly dried up, the smoke from burning grass and brush often becomes so thick that the sky is yellow and the sun is partly obscured. The coffee seeds are planted, and the young trees are started in wicker baskets kept under the shade of the forest trees, which are almost always to be found in some part of every fazenda, in order to protect the youthful plants from the sun. In eight to twelve months after planting, the young seedlings are removed from the nurseries to the plantations, where they are placed at distances of 4-5 meters apart. The transplanting should be done at the beginning of the rainy season, and preferably in damp and cloudy weather. The seedlings are set into circular holes dug into the ground, and over the tops of these holes, above the little trees, is laid a loose thatch-

work of corn stalks, straw, twigs or leaves, to serve as a protection against excessive heat, and against frost, but the former seems to be the principal danger in mind. Except in their earliest stages, the coffee trees in São Paulo are not shaded for protection against the sun. In many of the other coffee countries, shade is necessary, and banana trees are very commonly used to provide this protection. In fact, the whole matter of the best shade trees to be used under different conditions has been carefully studied. Such trees as close up their leaves at night, thus offering less obstruction to radiation from the leaves of the coffee itself and resulting in a heavier dew deposit upon the latter, are mentioned by one authority on coffee as being the most desirable. This is surely an interesting example of botany applied to economic climatology. It is apparent that when cultivated near the equator, where insolation is more intense, shade is necessary, whereas towards the margins of the tropical zone, as in São Paulo, such protection is not needed. In its natural state, coffee does best under shade.

Frost is the climatic element which the São Paulo coffee planters fear most, and yet many of the accounts which have been printed exaggerate very much the danger which may result therefrom. The writer was unable to find any considerable fear of frost in the minds of the superintendents of the coffee fazendas with whom he talked. They realize that frost is likely to occur any year; that there have been occasions when large numbers of trees have been damaged, temporarily or permanently; but that no appreciable injury comes oftener than about once in five or six years. They rely on the protection which they give the young plants against sunshine to protect them equally well from frost, and they are very careful indeed to plant their coffee at altitudes which will bring the trees above the frost limits. "Smudges" are not used, so far as the writer was able to ascertain. The smaller danger from frost on the hillsides than in the valley bottoms and on the lowlands has taught the *fazendeiros* to begin to plant coffee at about 600 meters, more or less, above sea-level. The exact altitude varies locally, according to the topography. Each *fazendeiro* knows the usual "frost holes" on his own fazenda, and recognizes the well-known "streakiness" or "patchiness" of frost, which sometimes plays curious pranks in the damage it does. There is no more striking feature of the climatology of the Brazilian coffee district than this marked dependence of the altitude at which the trees are planted upon frost occurrence. Over and over again even the casual traveler cannot fail to be impressed with the fact, plainly visible from the car windows, that the rows of coffee trees do not

extend all the way to the bottom of most of the slopes, but stop short at a certain definite height, corn or some other crop occupying the lowest slopes and the valley bottoms.

The writer, on his recent trip, saw some coffee trees on the *lower* slopes of the hills frost bitten. It has been noted by previous writers that coffee trees may be planted at lower levels where there is a stream flowing through the valley, because under such conditions the relative humidity is higher, and fog, which serves as a protection against frost, is more likely to occur than where there is no river. In many coffee districts where the trees are liable to injury by high winds, or by winds which bring excessive heat or cold, protected situations are sought for the plantations and wind-breaks are planted, but in Brazil this precaution does not seem to be necessary. It is customary, in countries where strong prevailing winds are to be guarded against, to form a judgment as to the exposure of any given locality where coffee-planting is to be undertaken by noting whether the trees of the natural forest are wind-blown. If these show unsymmetrical growth, it is clear that the coffee trees will also suffer. The importance of an abundance of running water in preparing the coffee for market is one of the most striking lessons which the visitor to a coffee fazenda will learn. Hence a sufficiently abundant rainfall is an element of the climate which is essential. There is still another respect in which the São Paulo coffee district is singularly favored, climatically. To one who reads the extensive literature of coffee, it is a most striking fact that Brazil has suffered so little, as compared with most of the other coffee countries, from coffee pests and diseases. This is partly, we may even say largely, the result of the exceptionally favorable climate. Certain of the coffee leaf diseases are pretty surely brought on by a weak condition of the shrubs resulting from prolonged exposure to drought. Other diseases, such as "rot," are due to excessive moisture and low temperatures. Finally, the climate of São Paulo, being neither very hot nor very damp, is far less favorable to the growth of noxious weeds than is the case in many other coffee countries.

THE HARVEST: The harvest in Brazil begins in May and lasts until August or September. It therefore comes in the dry season. The harvest was nearly over during the writer's visit in the middle of August, 1910. The climatic conditions which provide this dry season for the harvest, and for drying the berries, are of peculiar and very marked economic importance. The size of the crop may vary greatly from year to year, depending chiefly upon preceding weather conditions.

Coffee as we know it in the grocery store is the seed of the coffee berry, which is red when ripe, and has about the size and appearance of a small cherry, or a cranberry. The berry normally contains two seeds, flat on one side, convex on the other, the flat sides being together. These seeds are imbedded in a mucilaginous, saccharine, whitish pulp, which has an insipid, sweetish taste, and are themselves further enclosed in two envelopes. The inner of these, when dry, is a delicate, closely adherent, very thin covering, much like the thin skin which covers the white onion, and is known as the "silver-skin." It is easily removed by friction when dry. Outside of this inner covering comes a somewhat tougher, thicker and more loosely fitting envelope, not unlike the husk of wheat. The preparation of coffee for market involves the removal, from the inner seeds or beans, of the outside skin, the pulp and the two inner coverings. These intervening stages involve much care and good judgment, as well as the use of complicated and expensive machinery. The processes consist in: (1) the removal of the outside skin and of the pulp by maceration in water; (2) the washing and drying of the beans, after the removal of the pulp, but with the two inner coverings still on the beans; (3) the removal, when dry, of these two inner coverings, and (4) the sorting of the beans according to size and weight. Among these different processes the one which has the most interest for the climatologist is the drying stage. After the outer skin and pulp have been removed, and the beans have been washed and allowed to ferment a little, they are taken to the drying-grounds (*terreiros*).

DRYING THE COFFEE: The process of drying the coffee beans is the stage in which the greatest skill and care and good judgment are necessary, for upon what happens then, far more than upon the coffee as picked, depends the quality, the color and the commercial value of the coffee beans. During this stage the *administrador* is constantly called upon to decide how long this or that particular lot of coffee should be dried, and at exactly what moment it should be removed to the warehouse, awaiting its turn in going to the hullers. It is the drying stage, also, which has the most interest for the climatologist, for it is controlled at every point by meteorological conditions.

The drying-grounds are rectangular areas, square or oblong, varying a good deal in size, and numbering up to 16 or more on each fazenda. They are paved with Portland cement, square bricks or tiles, and usually have a gentle slope downhill, so that the water which carries the coffee may run off at the lower side, through iron

gratings, into small brick or cement-lined canals. Asphalt floors cannot be used, on account of their softening under the hot sun, and also because they give a taste to the coffee. Upon the separate divisions of these *terreiros* in the drying-season, one may see coffee in many stages of drying and of preparation. There is the coffee which, having been through the pulpers, has had most of the pulp and outer coverings removed, and is being dried before going to the hullers. There is coffee which went through the pulpers but which was not properly pulped, being too green, or too dry, or too small; this also is being dried, in order that outer covering and dried pulp and inner coverings may all be removed in the next stage. There is coffee which was too dry and too tough to go through the pulpers at all. There is coffee in all stages of drying. Each one of ten or a dozen separate divisions of the *terreiros* may contain a lot of coffee in a different stage of drying, and requiring different periods of drying. All this the *administrador*, or one of his immediate subordinates, has to look after, and it is just here that there is the greatest need of good judgment and of experience. When the *terreiros* are well filled, during harvest-time, they present an interesting scene, with many laborers constantly moving about, spreading out the coffee or gathering it up into heaps so that fermentation may take place; giving some more sun and some less sun; always under the watchful eye of the superintendent whose decision in each case is final. There can be no hard and fast rule about drying coffee; it is almost true that each wagon-load of coffee from the harvest requires separate treatment. In order to increase the temperature on the *terreiros*, the tiles are blackened, and under the noon sun and the cloudless skies which are characteristic of winter, the absorption of insolation is very great, and the heat, as one walks across the drying-grounds, is very intense. It was a constant source of wonder to the writer that the Italian laborers occupied in the drying of the coffee were able to walk with bare feet over these *terreiros*. The heat, and dryness, and glare were desert-like in their quality. The weather was simply ideal for drying: hot early afternoon hours, cool evenings and nights; low relative humidity; light wind, sufficient to promote active evaporation, yet not enough to blow the coffee about. No one can fully appreciate what outdoor drying means who has not been to the coffee country, and who has not himself experienced the weather conditions which prevail during the winter. During the writer's stay at the *fazendas* of Santa Veridiana and Santa Cruz the days were almost cloudless, with a light wind whose direction was evidently controlled by the topography, but which was in general easterly. The

early afternoon temperatures rose to 80° or a little over, with relative humidity between 45% and 50%. In the evening and early morning the thermometer read down to between 50° and 70°, with relative humidities of 70%-75%. On the *terreiros* themselves, in the early afternoon, the temperatures ranged from 2° to 5° higher than those above noted, and the relative humidities were between 40% and 45%. There was a striking absence of cumulus clouds, and it was noticeable that there was but a little inconvenience from perspiration. Both of these features are explained by the dryness of the air. The *administrador* of the Santa Veridiana *fazenda* told the writer, at the time of his visit in August, 1910, that the weather was wonderful for drying, and that no one could ask for anything better.

The duration of the drying-stage naturally varies very greatly: sometimes it lasts only a day or so; sometimes it takes several days, or even weeks. It all depends on the weather, and on the condition of the coffee, whether pulped or not, and whether already more or less dry as it comes in from the trees. Coffee in berry, *i. e.*, not pulped, takes much longer to dry. Rain, while not injurious to coffee on the *terreiros* which is still wet, is a serious injury to beans which are already nearly, or quite dry. Hence it is customary to have the coffee piled up at night at the center of each division of the *terreiro*, and covered over with canvas,* held down at the corners and edges with bricks. In São Paulo there is not much danger of any considerable damage from heavy rains in the winter months and the canvas coverings are usually quite sufficient protection.† Care is also needed to keep coffee which is in a critical stage of drying from excessive baking under the hot sun. It is an important part of the duty of the night watchman on a Brazilian coffee *fazenda* to keep watch of the weather, and in case of threatening rain, or of a high wind which might blow the coffee away, to summon the "colonists" to gather and cover up the beans.

The usual method of determining whether the coffee has been sufficiently dried to go to the hulling machines is to rub some of the beans hard between the palms of the two hands. If the two inner envelopes are removed by this friction, and are dry and brittle instead of tough, it is a sign that the beans are ready to be removed from the *terreiros*. Absolute dependence upon weather conditions, as happens in the open-air drying method, is often a long and always a more or less uncertain process. Therefore, just as we see, around

* Sometimes mats, or zinc covers, or bunches of long grass are used instead.

† In countries where heavy rains are expected, the coffee is sometimes kept out in trays or drawers, which are easily carried under cover or covered over. Other devices, such as metal roofs on wheels, which can be rolled out to the *terreiros*, are also sometimes used.

our large cities, more and more cultivation of garden truck under glass, where artificial heating, and watering, and protection against hail and heavy rains and frost, are easily provided, so the artificial drying of coffee seems likely to solve the difficulties of sun-drying. Artificial drying is the result of man's ingenuity in making himself more and more independent of the uncertainties of the weather. There are already several appliances for steam-drying coffee on the market, and it is likely that in time these will come into more and more general use, to supplement perhaps, rather than to replace, the open-air drying. At present, however, there is a strong feeling on the part of most of the *fazendeiros* that sun-drying gives better results: that the coffee dries more uniformly and has a better color and flavor.

With the further stages in the process of preparing coffee for market we are not here concerned, because the climatic control plays no further part in them. From the plantations, when ready for market, the coffee is shipped in bags weighing 60 kilograms each (132 lbs.) to Santos, where it is put into warehouses and then loaded on board steamers bound to all parts of the world.

HUDSON LAND

BY

EDWIN SWIFT BALCH

During the return voyage of the *Terra Nova* from McMurdo Sound, South Victoria Land, in February and March, 1911, an important geographical discovery was made which clears up one of the lacunas in our knowledge of the Antarctic Regions, namely, the position of the coast line of East Antarctica between the northwest extremity of Victoria Land and the eastern point of Wilkes Land.

This discovery by the British Antarctic expedition is announced in the *Geographical Journal*, for May, 1911, p. 569, in the following words:

"The ship afterwards cruised in the vicinity of the Balleny Islands, and, though much hampered by strong winds and foggy weather, discovered (February 22) a mountainous land in about $69^{\circ} 50' S.$, $163^{\circ} 20' E.$ It was seen again on February 25, and followed to $68^{\circ} 30' S.$, $158^{\circ} 15' E.$, but the heavy pack (in which the ship was caught for a time) did not permit an approach within 10 miles. The pack was finally cleared on March 8."

These two landfalls of the *Terra Nova* lie in an almost direct north-westerly line from the land sighted to the west of Cape North by Shackleton, to the most easterly part of the mainland of East Antarctica, Hudson Land, sighted by the United States Exploring Expedition in 1840. The importance for geography of this discovery lies in the fact that it unites Victoria Land to Wilkes Land and completes the outline of the coast of East Antarctica, from the Great Ice Barrier to Kaiser Wilhelm II. Land.

The most northerly of the *Terra Nova's* landfalls must be situated about 80 miles to the east and some 60 miles to the south of Hudson Land. Hudson Land was sighted to the southward by Lieutenant Charles Wilkes, U. S. N., on January 19, 1840, on the U. S. S. *Vincennes*, from a position in $154^{\circ} 30'$ E. long., $66^{\circ} 20'$ S. lat.; and on the same day by Lieutenant William L. Hudson, U. S. N., on the U. S. S. *Peacock*, from a position in $153^{\circ} 40'$ E. long., $66^{\circ} 31'$ S. lat. It was charted by Wilkes as Cape Hudson, but it is evidently a coast, and must be known and charted for the future as Hudson Land. How far Hudson Land lies south of the Antarctic Circle is, of course, still uncertain. Passed Midshipman Eld said he thought it was about 40 miles distant,* which would place it in about 67° S. lat., but it may easily have been farther, for distances in the Antarctic are almost always underestimated. It will probably turn out to be in about $67^{\circ} 30'$ S. lat.

To American geographers the paramount interest of the *Terra Nova's* discoveries lies in the fact that they make certain the existence of Hudson Land. For the lay of the *Terra Nova's* coasts as well as the lay of the coasts west of Hudson Land distinctly prove that Hudson Land cannot be far from its charted position. Moreover, since the accuracy of the observations of the American officers have also been proved in two other places by other expeditions, by D'Urville and Drygalski, we may feel confident that their other observations are equally trustworthy, and that they sighted Emmons Land, Case Land, Alden Land, North Land, Totten Land, Budd Land, and Knox Land, as well as Hudson Land, Adélie Land, Carr Land, and Termination Land. And furthermore, the new evidence which little by little each successive expedition to East Antarctica has added to what was discovered there by the United States Exploring Expedition, totals up more and more to prove that the great land lying between and including Hudson Land and Termination Land rightfully bears the name of Wilkes Land.

* Edwin Swift Balch: *Antarctica*, p. 149.

GEOGRAPHICAL RECORD

AMERICA

STUDY OF SHORELINE CHANGES ALONG THE ATLANTIC COAST. Prof. D. W. Johnson of Harvard, and assistants, is making a study of shoreline changes along the Atlantic Coast this year. The most important localities from the Bay of Fundy to Southern Florida will be examined during the spring and early summer. Special attention will be given to changes in the form of beaches within recent geological time and to supposed evidences of recent coastal subsidence. As the problem of coastal subsidence is affected by the relative heights of high tides on the outer and inner sides of barrier beaches, lines of levels will be run between the ocean and lagoons upon which tidal observations will be based. During the latter part of the summer, Prof. Johnson will visit places on the coast of England, Holland and Sweden to make comparisons with similar localities on the Atlantic coast of North America. The work will be the second Shaler Memorial Research supported by the Shaler Memorial Fund of Harvard University.

A GREAT ARC OF PRIMARY TRIANGULATION (TEXAS-CALIFORNIA). The Coast and Geodetic Survey has just completed a great arc of primary triangulation more than 1,200 miles in length, extending from central Texas to the Pacific coast. It connects the 98th meridian primary triangulation in the vicinity of Weatherford, Texas, with the Pacific coast primary triangulation in the vicinity of San Diego, Cal.

It is connected with the United States and Mexican boundary at a number of places and is joined to and correlates a number of detached government surveys. It furnishes the geographic positions on the U. S. Standard Datum, of more than 200 points which can be used to control all future public surveys within the region traversed.

There are 92 primary stations in the main scheme of this triangulation and, in addition, 38 stations in secondary schemes which provide for the connections with United States-Mexican boundary monuments and existing triangulation. The total area covered by the triangulation is 48,400 square miles, the average length of line east of El Paso is 17 miles, and from that place to the Pacific coast it is 62 miles. The maximum length of line is about 120 miles. The observations were made with a 12-inch theodolite, the pointings being made on heliotropes and acetylene lamps mounted at the stations observed upon. During the progress of the triangulation two primary bases were measured and 24 primary azimuths were observed.

The reconnaissance for this work was made between September, 1907, and February, 1908, and the observing was done in three seasons between November, 1908, and February, 1911. The total work was done in less than three years and six months, and the observations in less than two years and four months.

While the Coast and Geodetic Survey has, in the past, made more rapid progress on primary triangulation in the United States than that made in any other country, yet the rate of progress on the Texas-California arc exceeds that

on any other arc in this country and the unit costs per square mile of area covered by the main scheme and per mile of progress are only about one half those of the triangulation between Marysville, Cal., and Tacoma, Wash., the arc for which, previously, these unit costs were the lowest. The accuracy, as measured by the closing errors of triangles of the Texas-California arc, is greater than that specified in the requirements for such work.

The remarkable rapidity of progress and the low cost of the work were largely due to the small amount of camp equipage used by each unit of the party; to the fact that only two officers had charge of field work, Mr. William Bowie, Inspector of Geodetic Work in the Coast and Geodetic Survey, on reconnaissance and a portion of the first season's observing, and Mr. J. S. Hill on the remainder of that season's work and that of the succeeding two seasons; and to the services of a most efficient signalman, Mr. J. S. Bilby, who was attached to each party from the beginning of the reconnaissance to the end of the observing. The parties were organized and managed, in the main, in a manner similar to that of the parties engaged on other pieces of primary triangulation done by this survey in recent years, only such changes being made as were necessary to meet new conditions which were encountered in semi-arid and arid sections, much of which was also mountainous.

This arc of primary triangulation will not necessarily be discussed separately by this survey in investigations of the figure of the earth, as were the two great arcs, one extending across the continent along the 39th parallel of latitude and the other paralleling the Atlantic coast from Maine to the Gulf, and known, respectively, as the "transcontinental arc" and the "oblique arc." In the last two publications by the Coast and Geodetic Survey on investigations of the figure of the earth (entitled, "The Figure of the Earth and Isostasy from Measurements in the United States" and "A Supplementary Investigation in 1909 of the Figure of the Earth and Isostasy") the method was adopted of using the entire connected network of triangulation.—(WILLIAM BOWIE, in *Science*, April 7, 1911.)

GLACIAL STUDIES IN ALASKA. The Research Committee of the National Geographic Society of Washington has made an appropriation of \$5,000 for continuing the glacier studies of the two previous years in Alaska. The work, beginning in June, 1911, will be done by Professor R. S. Tarr of Cornell University and Professor Lawrence Martin of the University of Wisconsin, who directed the National Geographic Society's Alaskan Expeditions of 1909 and 1910, in the Yakutat Bay, Prince William Sound, and lower Copper River regions. The 1911 expedition will study briefly a number of regions of glaciers not previously investigated by that Society, although partially mapped by the Alaska Division of the U. S. Geological Survey, the Boundary Commissions, etc. Work will be done on the present ice tongues and the results of glaciation in the mountains and plateaus of parts of the interior and some of the fiords of southeastern Alaska, the former having lighter rainfall and smaller ice tongues than the Yakutat Bay and Prince William Sound regions.

RAINFALL OF PORTO RICO. The "*Average Annual Rainfall of Porto Rico, W. I.*," is the subject of a paper by Dr. Oliver L. Fassig, in the November (1909) number of the *Monthly Weather Review*. This is a preliminary report, a complete discussion of the climate of Porto Rico being promised in the future. The geographical distribution of the rainfall is shown by seasonal and annual charts. For the whole island the mean annual is 77 inches; varying from 37

inches along the south coast—an area devoted largely to the cultivation of sugar cane—to a maximum of 136 inches on the eastern slope of the Luquillo Mts. in the northeast portion of the island. From this area of heavy precipitation a number of streams flow down, to water the coffee and sugar plantations of the surrounding country. Along the north coast, where the citrus fruits and pineapples grow, the average fall is about 65 inches. The rainfall on the north side of the island is greater in amount, and more advantageously distributed throughout the year, than that on the south side. On the latter, periods of four or five weeks with little or no rain are of frequent occurrence, and periods of two or three months with less than an inch of rain are not uncommon. Irrigation works are now being planned in this southern area. At present, it costs planters from \$25 to \$50 an acre per year to pump ground-water for irrigating their cane fields. There are no well-defined wet and dry seasons. The winter rains are comparatively light, with a minimum in February. There is a steady increase in rainfall from February through May. October gives the maximum for the island as a whole. For the island as a whole, autumn has 26 inches; summer, 23 inches; spring, 16 inches; winter, 11 inches. R. DEC. WARD.

A SMALL HANGING VALLEY. In view of the many recent discussions in regard to hanging valleys, the accompanying photograph may be of interest. It shows a very interesting, though miniature, hanging valley developed along a



small stream at the time of the draining of an old mill pond. The picture was taken along Cobb's Creek between Bryn Mawr and Philadelphia in late spring. During the winter or spring the old dam forming the pond had broken away and, when first seen, the stream had cut its way down to grade through the eight or ten feet of silt which filled the pond. The stump shown in the foreground of the picture was laid bare by stream erosion after having been long

buried under the covering of silt. It undoubtedly represents a tree that had been growing on the floodplain of the stream before the time of the building of the dam, possibly 75 or 100 years ago.

The small entering side stream shown in the center of the picture has been unable to cut down its valley to the level of the master stream and thus enters the main stream over a waterfall about 18 inches high. The hanging valley thus formed above the fall is open,—a wide U-shaped trough. The crest of this fall seems to be determined by a slightly more resistant layer of clayey silt. The tributary stream, though small, is constant in its flow,—not simply a wet weather rivulet. Developed on a small scale and in unconsolidated material and in the course of normal stream erosion, this hanging valley nevertheless strikingly resembles many of the large ones, even those developed by glaciation, which have come under the observation of the writer.

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ASIA

DR. STEIN'S MAPS. Besides the vast store of archæological information which Dr. Aurel Stein brought back from Chinese Turkestan and Western Kansu, he and his assistants from the Survey of India carried out a very large amount of careful topographical surveying, which very greatly improves the maps of that region. Plane table surveys were carried on continuously during the journeys, and these were controlled by astronomical observations for latitude made at 72 stations, and by others made during a previous journey in 1900-1. From this material ninety-four sheets are being prepared by the Survey of India on the scale of 1:253,440, and will be published in the form of an atlas to accompany the detailed report on the scientific results of Dr. Stein's last journey. In the meantime reduced copies have been published by the Royal Geographical Society in the *Journal* for March. The whole area from Kashgar to Kan-Chou (Long. 75°-101°), including the Takla Makan desert and the mountains bounding it, is plotted on the scale of 1:3,000,000. Other maps on the scale of 1:1,000,000 show the Kun-Lun range on the frontier of Kashmir, and Western and Central Nan-Shan to the eastward. On all these maps, heights which have been determined by triangulation, or by barometric or clinometric observations, are shown, names have been carefully revised, and the areas occupied by cultivation, scrub or jungle, and desert have been distinguished. The whole forms a most valuable addition to Asiatic cartography. (*Nature*, April 20, 1911.)

EUROPE

COMPLETION OF THE MAP OF THE GERMAN EMPIRE IN 1:100,000. In view of the long existence and accurate topographic surveys in Germany it was somewhat surprising to learn (*Geogr. Zeitschr.*, Feb., 1911, pp. 102-104) that the standard topographic map of the country, which bears the above title, was completed only last year. This is due to the fact that prior to the foundation of the Empire no map existed representing the entire country on the same scale. In 1878 the topographic survey bureaus of Prussia, Bavaria, Saxony and Württemberg drew up an agreement whereby the preparation of the map was apportioned among them according to the respective size of the territories under their military jurisdiction. Of the total number of 675 sheets, each measuring 30' in longitude and 15' in latitude, Prussia thus undertook to complete 545, Bavaria 80, Saxony 30 and Württemberg 20. When the great amount of detail

and the painstaking execution of the map are taken into consideration, together with the fact that some original and continual revisional surveys have been necessary for its preparation, the time elapsed does not seem unduly long.

The map is too well known among students of the standard topographic maps of the world to require comment. It may be of interest to note, however, that before its completion a new edition, in three colors, on the scale of 1:200,000 has been begun on which relief is represented by contours in brown, resulting in a map far more legible and pleasing than the original, printed in one color, with its hachures in black.

STUDENTS' GEOGRAPHICAL ASSOCIATION. In January an association of the students of geography at the University of Leipzig was founded with the object of promoting interest in geography among the students in general and of aiding in their work students of geography in particular. Papers are presented on geographic topics, followed by discussions, and excursions and informal gatherings bring the members into closer contact with each other. (*Geogr. Zeitschr.*, Feb., 1911.)

POLAR

DR. NANSEN EXPLAINS AMUNDSEN'S ADVENT IN THE ANTARCTIC. Much surprise was expressed when it was announced that Capt. Amundsen, instead of carrying out his plan of going to the Arctic Ocean through Bering Strait for a five years' drift across the polar area, had decided to enter the Antarctic field. His change of plan is now explained by a letter from Dr. Nansen, published in the *London Times* (weekly edition, April 28, 1911), in which he includes the long letter that Amundsen sent to him from Madeira.

It appears that when news arrived in the autumn of 1909 of the journeys of Cook and Peary in the Arctic regions, Amundsen felt certain that he would not be able to raise all the money required for his Arctic project. This conclusion was later justified by events, for he found himself unable to obtain the balance of the money, about \$40,000, which he needed for the long Arctic enterprise he was contemplating. He saw that he would have to change his plans and he decided to go to the Antarctic and to attempt to reach the South Pole, which, he believed, was the only phase of exploration left to him that might reawaken public interest and bring him the money he needed. He did not tell his plan to Nansen or other friends, fearing that they would try to dissuade him. He thought himself sufficiently equipped, however, to make a dash for the South Pole, and he announced his change of plan in his letter to Nansen from Madeira.

Dr. Nansen calls attention to the fact that the bases of operations of Scott and Amundsen lie far apart, there being about the same distance between them as between Spitzbergen and Franz Josef Land. Nansen concludes:

"It is beyond doubt that such an excellent explorer as Capt. Scott, with his carefully equipped expedition, will return with results of very high scientific value; but, on the other hand, Capt. Amundsen, by journeying through another region, will most certainly bring back valuable information of unknown tracts quite independent of Scott. I therefore think that students of polar problems have great reason to rejoice that two such eminent explorers are at work simultaneously in the south, as their discoveries and observations will supplement each other and the value of each will thus be greatly increased."

AN EXPEDITION TO JAN MAYEN. The Society is informed that Mr. J. Foster Stackhouse of England has organized an expedition to visit, in the coming

summer, Jan Mayen, northeast of Iceland in the Greenland Sea. The purpose is to chart the waters around the island and to make observations on land. Mr. W. S. C. Russell, Director of the Science Department of the Central High School, Springfield, Mass., has been invited to take the geological work in charge. His purpose is to make a study of the glaciers and ascertain the present condition of the two volcanoes Esk and Beerenberg. He will sail from Boston on June 23, to join the English party at Newcastle. Other members of the expedition will be an ornithologist from Sweden, an oceanographer who was with Scott in the Antarctic and Baron Klinckowström, of Stockholm, who was on the Belgica relief expedition and has done good work in Spitzbergen. The party expects to call at the little island of Mevenlint, almost unknown on the charts, and run a line of soundings around it.

EDUCATIONAL GEOGRAPHY

MAP STUDY IN SCHOOLS. The study of the map and its practical use should receive greater emphasis. The interpretation of geographic relations from a clear wall map will yield results that few teachers appreciate. Pupils should acquire the knack of rapidly sketching memory maps which illustrate certain definite features. No time should be given to the tracing of the detailed features of an irregular shoreline nor devoted to outlining a continent by an elaborate system of longitude and latitude. Blank maps for each pupil are essential in the distribution and progressive studies of climate, surface and commercial relations. Large blank wall maps are valuable in the class discussion of the resources, relief, drainage and any data that the teacher can readily plot thereon. Elementary geography in this country needs wall maps, charts and diagrams that are simple and clear in their delineated features and adapted to the capacity of the pupil. The American Geographical Society has given a distinct service to education in its traveling exhibit of foreign maps, and there remains a similar duty in a compilation of the American published maps accompanied by a statement of merits, defects and details of price, publisher, mounting, editions, etc.

The places to locate are more numerous now, but some phases of modern geography are of greater value to the child than mere mechanical location exercises. The plea, for such mnemonic work, indicates a serious neglect of the atlas and the map in the elementary school and a disregard of their habitual use. Why not be as sensible in the use of the map and the atlas as the dictionary? Let the teacher realize that work is half done when the history and the reading classes are conducted without the use of the map.

The necessity of illustrative material in geography is widely recognized by educational authorities. The modern texts have a generous assortment of pictures and maps, but the school equipment of globes, wall maps, charts, pictures, specimens, products and lantern slides is extremely scant in the elementary schools of the large cities. In one large city the cost of the geographical equipment in a single high school exceeds the total value of all the maps and the materials for the teaching of geography in one hundred elementary school buildings.—From "Present Problems in Elementary School Geography," by W. M. Gregory, *Journ. of Geogr.*, Vol. IX, No. 7, 1911.

INSTRUCTION IN METEOROLOGY. The last ten years have brought a very marked advance, and also a most effective improvement, in meteorological instruction in our schools and colleges. Anyone who will take the pains to

compare the geographical texts of a dozen or so years ago with the more recent volumes can easily convince himself of this fact. This is a most encouraging sign, for there are few studies which are better adapted for training in habits of system, accuracy and punctuality, and not one which contributes more, in the long run, to make daily life interesting. The atmosphere we cannot escape from. The physical experiments—for they are obviously physical experiments on a large scale—which go on in the atmosphere, are constantly brought to our notice. We cannot, if we would, fail to have our attention drawn daily, almost hourly, to the weather phenomena which, in a fairly regular yet never monotonous succession, are constantly recurring.

The text-book, "Manual of Physical Geography," by Dr. F. V. Emerson, of the University of Missouri (reviewed in *Bulletin*, Vol. 42, 1910, pp. 299-300), gives about 40 pages to a few well-chosen exercises on meteorology and climate. These, it is to be noted, are placed very near the beginning of the book, where they properly belong, instead of being tucked away as if they were an after-thought, in a less conspicuous place. The exercises cover insolation, a subject which, we agree with the author in thinking, is generally neglected, but of fundamental importance; annual and diurnal march of temperature; the effect of oceans and continents and of altitude upon temperature; relative humidity, and its hourly and monthly variations; rainfall; studies of cyclones and anticyclones; and miscellaneous climatic phenomena, such as land and sea breezes, chinook winds, dew, fog, clouds, frost, sailing routes, etc. Clearly, the number of topics here touched upon is so large that only a very brief study can be made of most of them. Nevertheless, the teacher who takes an interest in this side of geography can extend the work along the suggested lines, and by so doing will be able to frame a consistent and satisfactory course of instruction.

R. DEC. WARD.

GEOGRAPHICAL EQUIPMENT OF THE CLEVELAND NORMAL SCHOOL. The Department of Geography in the Normal School, Cleveland, Ohio, is designed to provide convenient facilities for the training of students to teach elementary school geography. The rooms devoted to this subject are on the second floor of the new building which is located south of University Circle and fronts to the east on Ambler Park.

The space given to geography is divided into a lecture room, laboratory, exhibit room, office, storage room and a small dark room. The lecture room has a raised platform upon which there is a demonstration desk with ample space for the class display of experiments, pictures, materials, etc. The projection apparatus and lantern slide cabinet is placed at one side of the demonstration desk and so arranged that it may easily be operated by the instructor. A blank wall space to the front and side of the room serves for the projection surface. The lecture room has blackboard space and two sliding map racks for the display of wall maps and charts.

The laboratory is a large well lighted room which has been arranged for the first hand study of various geographical materials and affords an opportunity for the student to prepare simple and effective teaching devices, i. e., charts, produce maps, modeling materials, local plans, outline maps, diagrams, collections of raw materials and pictures. At the front of the room is a large demonstration table provided with gas, water and numerous storage drawers. The eight large work tables have individual lockers and accommodate four students each. The tables are flat topped and are fitted with detachable map

racks. Large sliding map racks at the front of the room supply display space for maps, charts and diagrams. A lead lined modeling table, fitted with storage bins for clay, sand and shelves for modeling boards, occupies one corner of the laboratory. There is an exposure shelter for meteorological instruments.

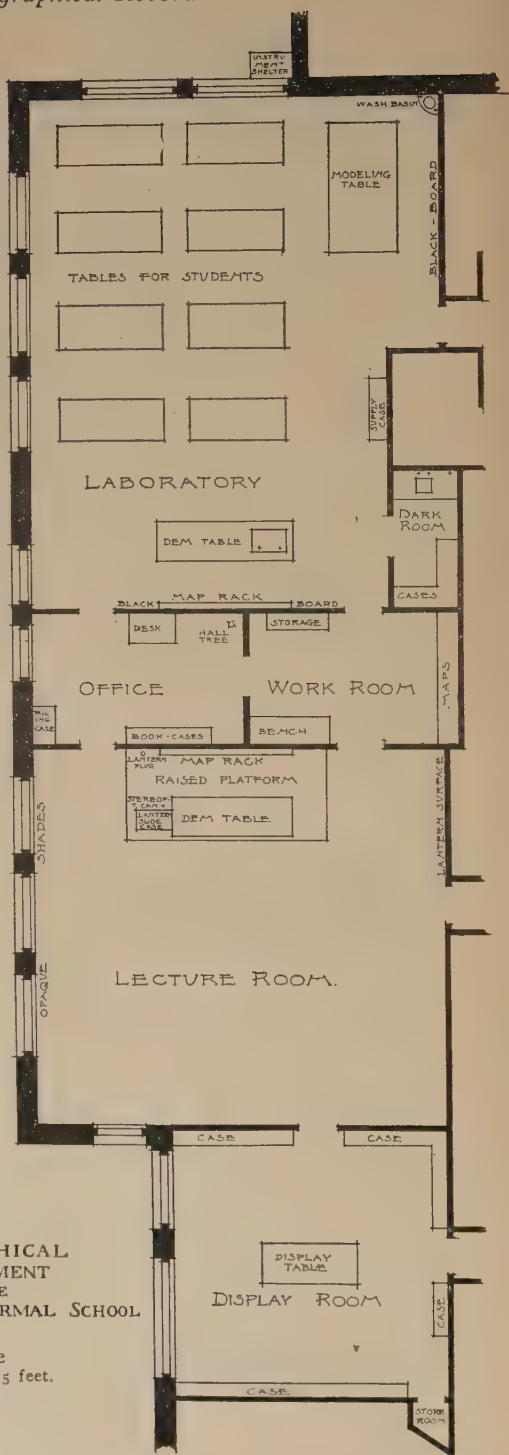
The small exhibit room is designed to display geographical materials and objects for inspection and study by students. The side walls of this room are fitted with display cases which have slanting shelves. In the center of the room is a special exhibit case with plate glass top and fitted with four tiers of interchangeable drawers which serve for the storage and display of material.

The storage room has a map case with the upper three compartments for rolled maps, while the lower four cupboards and three drawers are for flat maps, charts and supplies. In the storage room there is an additional case for supplies and a small work bench. The dark room is provided with gas, electricity and water on the developing bench and wall cases for materials. The office which is between the lecture room and the laboratory is provided with desk, filing cases and ample book cases for a departmental library.

W. M. GREGORY,
Cleveland, Ohio.

GEOGRAPHICAL
DEPARTMENT
OF THE
CLEVELAND NORMAL SCHOOL

Scale
1 inch = 15 feet.



GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY)

BOOK REVIEWS AND NOTICES

AMERICA

Annual Report of the Topographical Surveys Branch, Dept. of the Interior, 1909-1910. v and 162 pp., 19 illustrations and, in separate pocket, 10 maps and 8 profiles. Ottawa, 1911.

This *Report* of the Canadian government bureau corresponding to our General Land Office, which covers the year ended March 31st, 1910, contains the usual summary of the year's work by the Surveyor General (pp. 1-19) and extracts from the individual reports of the Dominion Land Surveyors. Beginning with this volume the description of the townships subdivided during the year will be omitted, as they are of little general interest. They will be printed separately for land seekers and intending settlers. The individual reports include:

Measurement of Kootenay Base Line by P. A. Carson (pp. 53-70). This base line, over five miles long, measured with an invar apparatus, was laid out in the Columbia Valley, about twenty-five miles S.E. of Golden on the Canadian Pacific Ry. It controls the complete network of the triangulation survey in the Railway Belt of British Columbia, from the summit of the main range of the Rocky Mountains westward to the Coast Range.

A. H. Hawkins (*Report*, pp. 84-91) throws much new light on the country at the head of the Smoky and Simonette Rivers along the eastern flank of the Rockies in 54° N. and suggests the reservation of this tract as a national park and game reserve.

J. N. Wallace's survey (pp. 148-154) of a part of the Fourth Meridian (110° W.) led to the delineation of a lake not hitherto shown on any map, Primrose Lake, in $54\frac{3}{4}^{\circ}$ N., extending forty miles in a S.W.-N.E. direction.

The information in the *Reports* of the Topographical Surveys Branch is in the nature of raw material and requires correlating to become of general value. This is a task which amply repays any tediousness it may involve because of the wealth of new data the reports contain as to the topographic features and natural resources of large tracts of territory which, in many cases, are practically unexplored.

W. L. G. J.

A Descriptive Sketch of the Geology, and Economic Minerals of Canada. By G. A. Young. With an Introduction by R. W. Brock. Geological Survey of Canada, Pub. No. 1085. 151 pp., 82 illustrations, 2 maps. Ottawa, 1909.

Synthetic works are fundamental because they give a general survey of their field, correlate its facts and thereby present them in their true perspective. It is highly encouraging that the official survey organizations, both national and

state, or provincial, of Canada, the United States and Mexico, include among their publications works of a general character, for the trained investigators in the field, although growing in number, are still too few to make adequate use of the quantity of admirable material of a detailed nature which the various surveys are producing. Synthetic works are, therefore, always welcome. Such a work is the one under discussion.

Although written with a view to supplying the general information contained in such outlines as Dawson's sketch of the physical geography of Canada in the Handbook of Canada, prepared at the time of the Toronto meeting of the British Association for the Advancement of Science or the earlier Physical Geography of Canada by Selwyn and Dawson, both of which are now out of print and not always readily accessible, it does not pretend to supplant them, nor is its scope quite the same.

In the introduction R. W. Brock, the Director of the Survey, not unreasonably predicts a promising future for the mining industries of Canada, arguing by the analogy of conditions in the better known, although still far from thoroughly explored, southern parts of the geological provinces of the Dominion, with those in their practically unexplored northern portions.

The main part of the work, by G. A. Young, is divided according to the natural regions of Canada. Of each region a general characterization is first given, followed by its geologic history and a description of its economic minerals. A chapter on the Glacial Period in Canada forms the conclusion.

As the natural region is the unit of geographic investigation a short summary of the divisions used in the work, which, although not original, constitute its principal claim to geographic value, may not be out of place.

The natural divisions established, which are not necessarily included in their entirety within the domain of the Dominion, are: (1) The Appalachian Region, (2) the St. Lawrence Lowlands, (3) The Laurentian Plateau Region, (4) the Arctic Archipelago, (5) the Interior Continental Plain, (6) the Cordilleran Region.

The western boundary of Canada's portion of the Appalachian region is the St. Lawrence Valley up to Quebec and thence the St. Lawrence-Champlain fault extending S.W. to the foot of Lake Champlain.

The Canadian share of the St. Lawrence Lowlands, bounded on the north by the southern edge of the Laurentian Plateau, is divided into three subdivisions by the low spur of the Laurentian Plateau which crosses the St. Lawrence and forms the Thousand Islands, and by the Niagara Escarpment, which enters Canada at the Niagara Peninsula and extends thence northwest through the Indian Peninsula, separating Lake Huron and Georgian Bay, and is continued in the Manitoulin Islands.

The Laurentian Plateau is Suess's "Canadian Shield," the U-shaped nucleus surrounding Hudson Bay and bounded on its outer convex side by the great chain of lakes from Great Bear to Huron and by the St. Lawrence depression.

The Arctic Archipelago defines itself. Its eastern members are a continuation of the eastern rim of the Pre-Cambrian formations of the Laurentian Plateau, its western members are mainly Paleozoic.

The Interior Continental Plain is included between the Laurentian Plateau and the Cordilleran Region. Its subdivisions are mainly vegetational: a southern, or prairie, and a northern, or wooded section, merging in about 54° N. It terminates to the north at Great Bear Lake beyond which the tundra extends.

Its southern prairie portion is divided into three levels by two lines of escarpment trending N.W.-S.E., the Manitoba Escarpment and the Missouri Coteau.

Canada's portion of the bi-continental highland, the Cordilleran Region, is subdivided into three longitudinal divisions, two mountain systems on its borders enclosing an irregular plateau region. The eastern mountain system includes the Rocky Mountains and, N. of the Liard River, the Mackenzie Mountains; the western system, the Coast Range. The central plateau region is separated transversely by a broken, elevated belt of land dividing the Yukon and Liard River systems. The two portions of the plateau thus isolated are known as the Interior Plateau of British Columbia, in the south, and the Yukon Plateau, in the north.

For further details the reader must be referred to the work itself. The numerous illustrations are well chosen, being typical of the regions they represent. The two valuable maps, one of the geology and one of the distribution of the mineral deposits, were listed in the May *Bulletin* (p. 390). W. L. G. J.

The Buccaneers in the West Indies in the XVIIth Century.

By C. H. Haring. viii and 298 pp., bibliography, index, 10 maps and illustrations. E. P. Dutton & Company, New York, 1910. \$3.50.

Although the annual fair formerly held at Porto Bello on the Isthmus of Panama was open at most for forty days and sometimes for only ten or twelve, the volume of business transacted was estimated at the beginning of the eighteenth century to amount to \$200,000,000. Let us consider this fact in connection with the circumstance that Morgan had proved that neither Porto Bello nor Panama could withstand the buccaneers. Between 1655 and 1671 alone the corsairs sacked eighteen cities (Porto Bello once, Panama once, other cities repeatedly) and plundered and destroyed about forty Spanish-American villages and towns. Mr. Haring quotes an estimate made in 1685 to the effect that the losses of the Spaniards at the hands of the buccaneers "since the accession of Charles II" amounted to 60,000,000 crowns, and those figures did not include the loss of more than 250 merchant ships and frigates. Again, in 1697 Cartagena was captured by a force which was partly composed of buccaneers, the plunder in this case being valued at \$100,000,000. Evidently the field for the exercise of the talents of those freebooters who chose the Spanish Main as the scene of their exploits was richer and wider than ever at the close of the seventeenth century. Why, then, does their history end with the raid on Cartagena?

Mr. Haring answers that Spain's American possessions were at that time actually much more profitable to the other European nations than to the Spaniards themselves; that it was the English, the French, and the Dutch traders who carried their merchandise to Spanish ports and freighted the Spanish-American fleets, and who appropriated the greater part of the gold, silver, and precious stuffs which the Spanish fleets brought back from Porto Bello and Vera Cruz. Therefore the capture of a Spanish galleon or the destruction of a Spanish-American town came to be regarded as a blow directed less at the Spaniards than at the foreign merchants who were interested in the trade between Spain and her colonies. Naturally the English and French governments abandoned the old policy of connivance and encouragement, adopting instead severe measures for the suppression of buccaneering, "because they came to

realize that it was easier and more profitable to absorb the trade and riches of Spanish-America through the peaceful agencies of treaty and concession than by endeavoring to enforce a trade in the old-fashioned way inaugurated by Drake and his Elizabethan contemporaries." The author's very sensible view of this matter fairly indicates the character of his book, every chapter of which may be read with pleasure and profit. There are chapters on the Spanish colonial system, the freebooters of the sixteenth century, the beginnings of the buccaneers, the conquest of Jamaica, Tortuga, Porto Bello and Panama, the suppression of the buccaneers by the government, and the lapse of buccaneering into mere piracy.

M. W.

An Unknown People in an Unknown Land. An Account of the Life and Customs of the Lengua Indians of the Paraguayan Chaco, with Adventures and Experiences met with during twenty years' pioneering and exploration amongst them. By W. Barbrooke Grubb. 330 pp., illustrations and map, appendices and index. J. B. Lippincott Company, Philadelphia, 1911. \$3.50.

Vast levels of treeless grass-land interspersed with open palm groves or scrubby thickets, in rainy seasons a vast swamp with water everywhere though rarely open, in dry time a withered prairie, desolate and inhospitable, foodless but for the abundant lung-fish (*Lepidosiren*) buried in the mud beneath the baked surface, whence they are dug out by squalid Lengua Indians, clothed to the waist with a single garment, the women of skins, the men of a blanket—such is the Chaco in Paraguay. The Lengua is low in the arts, possesses almost nothing, has no permanent home, gorges himself when he happens on food, but is lazy and improvident lest his fellow profit by his labors. The law of his tribe would compel him to admit less energetic members to his house if he made it larger or drier, so he makes but a wind-break of branches. As surplus of corn or other food would be at once property of his companions he produces only for merest necessity.

Among these men, hostile and suspicious of foreigners, W. Barbrooke Grubb thrust himself some twenty years back, unwelcome, but resolute to win their confidence. Early chapters seem to make capital of the hardship and danger of the attempt. There is no need. It was a man's task well done. For years alone, he mastered their language and their habits, won their confidence and their liking, and the picture he paints of their ways and thoughts impress us with the nearness of his approach to that strange, shy creature, primitive man. He believes they have degenerated from a previous, higher state, coming perhaps from the Andes. The socialistic law that forbids individual ownership has been imposed on them, like their habit of infanticide, by the harsh conditions of their wanderings through the forest. Progress was begun by the Mission in improving their condition when this socialism was destroyed (all unconscious Mr. Grubb, the while, that the irony of circumstances is bringing another band of white socialists a quarter way round the world from Australia to try out the community-of-goods idea only 500 miles away—and fail,—in the colonies Nueva Australia and Cosme).

The Mission has fixed the Indians in permanent homes, has checked infanticide, is teaching industry and thrift. It is an accomplishment and Grubb's part an amazing contribution to human endurance and steadfastness and to knowledge. The book is good reading, but the reader will not wish to emigrate to the Paraguayan Chaco.

MARK JEFFERSON.

The Great States of South America. A Concise Account of their Condition and Resources, with the Laws relating to Government Concessions. By Charles W. Domville-Fife, Author of "Submarines of the World's Navies," "The United States of Brazil," etc. xv and 235 pp., index, 72 illustrations, 8 maps. G. Bell and Sons, Ltd., London; The Macmillan Company, New York, 1910. \$4.50.

The author says that British capital invested in South America amounts approximately to the sum of £500,000,000, not including the private investments of individuals. When we consider British investments in the central portions of Latin America as well, \$1,000,000,000 must be added, since he asserts that it is the £700,000,000 from England and her dominions beyond the seas which have financed the countries of South and Central America; and there is exultation in his words: "So strong has England's position in South America become that these countries now look to her whenever they require financial help or counsel; and when they receive it, as has hitherto nearly always been the case, they are willing to give much in return. . . Their warships, railways, waterworks, tramways, and all other public services are the highly satisfactory results of capital supplied from the vast store of the United Kingdom."

The South American countries described are Argentina, Brazil, Chile, Peru, Paraguay, and Uruguay; and the author has included the Central American state of Guatemala in the list. The work, published under the authority of the Consuls-General of the countries just enumerated, has been revised by diplomatic and consular representatives in Great Britain. Furthermore the author has too readily accepted as authoritative and reliable the official statistics and other advertising matter furnished by the governments of the countries treated. It is scarcely necessary to add that extremely favorable views of many doubtful subjects are concisely presented. The design certainly was not to render less attractive to capitalists and immigrants of the better class such accounts as are given of the laws, regulations and conditions relating to government concessions. These eight Latin American republics are represented as being blest with stable governments, and armies, navies, and police forces that can be relied upon in the event of either internal or external troubles or emergencies. The vast field is not only full of promise but already is most important, according to Mr. Domville-Fife.

M. W.

AFRICA

With Mulai Hafid at Fez. Behind the Scenes in Morocco. By Lawrence Harris, F.R.G.S. xvi and 270 pp., and illustrations. Richard G. Badger, The Gorham Press, Boston, 1910.

This book is an account of the interview of an English newspaper reporter with the Sultan of Morocco at Fez. The story covers a journey from Tangier to Fez, various audiences with Mulai Hafid, the extreme dangers of travel and life in the country, the excessive cruelty of punishments and glimpses, now and again, into the degraded lives and weak character of the people. The narrative teems with rehearsals of cruelty and squalor. The testimony of the book bears out the charges of brutality, corruption, tyranny and chicanery which are so freely made against this government and people. With such a distressing picture one may rejoice that most of Africa has been improved under the influence of the strife for land of European powers.

R. M. BROWN.

Nigerian Studies; or, The Religious and Political System of the Yoruba. By R. E. Dennett. xv and 232 pp., map, illustrations, and addendum. Macmillan & Co., Ltd., London, 1910. \$2.75.

This book is a collection of notes on the religious and political system of the Yoruba, a once powerful negro people now much reduced and included in the sphere of British influence. The book opens with a brief account of the history of Yoruba Land. In the second chapter is a story of creation as told by an old priestess and a description of the sacred stones which are supposed to be the metamorphosed gods of the creation. The third chapter describes the death and burial customs. Ancestral worship forms a large part of the Yoruba religion and the beatification of the forbears of the people, so prevalent to-day, is a very old custom. The remainder of the book explains the social and religious systems as they appear in the occupations of fishing, hunting and in the marriage laws. The signs or omens of the fishermen have their counterparts in the superstitions of many races and are not unknown even among the more advanced races. The life of the hunter forms an interesting chapter which includes a conception of justice based on fatalism and an example of red-tape in the regulation of elephant hunting. The work can be recommended to any one interested in the development of savage races or in the stages of religious and philosophic thought. A number of illustrations and a good map are included in the volume.

R. M. BROWN.

ASIA

China Under the Empress Dowager. Being the History of the Life and Times of Tzu Hsi. Compiled from State Papers and the Private Diary of the Comptroller of her Household. By J. O. P. Bland and E. Backhouse. xv and 525 pp., illustrations and appendix. J. P. Lippincott Co., Philadelphia, 1910. \$4.

Information concerning the throne of China has been so vague and conflicting that we have known little and judged inaccurately of the motives and acts of rulers at Peking. This book of the life of the late Empress Dowager who ruled almost continuously for fifty-five years will, to some extent, be illuminative. She began her career as an imperial concubine in 1852, and from the outset her tact and her ability to handle difficulties were displayed. She easily ingratiated herself with the then Empress Dowager, Tao-Kuang's widow; became the first favorite of the dissipated Emperor, Hsien-Feng, and provided him with an heir to the throne. When the Emperor's mother died and the Emperor himself had paid the penalty of a dissolute life by an early death, Tzu Hsi, with celerity and resolute purpose seized the throne for her infant son, T'ung-Chih, assumed the Regency and nominally shared it with the Empress Consort. The first Regency extended through twelve years (1861-1873). At the end of that period, the Regents handed the control of affairs over to the Emperor, who like his predecessor was dissipated and soon paid the penalty by "mounting the Dragon's chariot and proceeding on the long journey."

Again, the claims to the throne were set aside and Tzu Hsi assumed the Regency, appointing Kuang Hsu, an infant, Emperor. This Regency lasted fourteen years (1875-1889). During 1898, on the exposure of a plot against the throne, the Empress Dowager appointed herself Regent once more and, practically imprisoning the Emperor, ruled the Empire until her death in 1908.

Tzu Hsi's long period of rule in China was not altogether an accident if we

can read between the lines of the Memorials and Decrees. It was really a usurpation of the throne. The authors with no lack of humor remark that "it was clear (and there were many voices to reassure her of the fact) that the stars in their courses were looking for the continuance of her unfettered authority, and that any trifling assistance which she might have given them would not be too closely scrutinized." This trifling assistance, after the death of the father of her son, included the degradation of the Empress Consort, the death of her own son, the ostracism of the son's wife, the neglect of the unborn child, the appointment of the next Emperor (and the appointees were always infants who must have a regent), the death of Kuang-Hsu's wife, the imprisonment of Kuang-Hsu, probably his death, the death of the Empress Consort, not to mention the host of ministers and advisers who were beheaded or invited to commit suicide. The history of her times sheds new light on many problems which have puzzled the Occident, such as the suicide of Wu K'o-Tu, the reform of 1898, the *coup d'état* of 1898, the Boxer movement, the status of Li Hsing Chang and the appointment of the present Emperor. The concluding chapter sums up the characteristics and life of this remarkable woman, who, although she broke many of the tenets of civilization from the western point of view, must be judged as one of the great women of history.

R. M. BROWN.

Palestine and its Transformation. By Ellsworth Huntington. xvii and 443 pp., map and illustrations, appendix and index. Houghton, Mifflin Company, Boston and New York, 1911. \$2.

As is well known to readers of the *Bulletin*, the author has had seven years of Asia, but his trails in the Holy Land were all of the year 1909. He threaded the little land fairly in every direction; across Philistia, Judæa, over the Ghor to Moab, Gilead, Jebel Druze, Damascus, Palmyra; to Petra in the south, across the Ghor again south of the Dead Sea to the parched land of the Negeb as well as through Samaria, Galilee and the Lebanon. He has the art of travel and accepts all situations. "In the cool, invigorating air of the spring afternoon we rode to Hebron, highest and most flourishing of Judæan cities—a pretty place, set on a tongue at the junction of two valleys and looking down the main fertile valley." But equally, "arriving at Beni Na'im we found the village deserted, for all the inhabitants had removed to the harvest fields, as is their custom in summer. After sleeping in the streets, we resumed our way."

Of adventures there is rarely more than a hint. A "good fortune" lost them in the eastern wilderness of Judæa and sent them stumbling down the cliffs to grope about the reedy, mucky plain until 10 at night, when Jericho was reached. When a couple of Druzes cover him with their rifles, his companions get their revolvers ready, "but as I had none all I could do was to tell Abdullah to say 'go to, this is unseemly, better put up your guns or you'll get into trouble.'"

They struggle with head winds on the inhospitable east shore of the Dead Sea in their little canvas boat, only to have to draw it up on the rocks and find their food and water spoiled by the bitter waters that have washed in. The hardships of wandering off the beaten tracks in such lands are often hinted at but never enlarged upon.

Huntington found Palestine interesting, very, but not beautiful, save in the momentary delight of glimpsing the sown land on some return from the desert.

We are shown the reason for the exclusiveness of the Jew in the topographic isolation of his land, which is further traced to its roots in material and geologic structure. The contrast between Jew and Phœnician is an admirable sample

of the work. Both dwell on narrow highlands at the east end of the Mediterranean. One race, north of Carmel, has wrought out its history on a fragment of the earth's crust that had suffered gentle subsidence beneath the sea long before history began, so that it invaded every valley and made a coast of alternating bays and promontories with some sort of shelter for ships. The land itself was all rugged mountain and valley, nowhere lacking views of the sea on which the rough slopes descended, to which every gorge and valley opened, and beside which lay all the towns. The call of the sea resounded forever throughout Phœnicia and the people fared forth to know the world and mix with its peoples.

In this sinking of the Phœnician shore Carmel was a sort of hinge point. To the south the shore rose instead of sinking and put between Judea and the Mediterranean a fifteen-mile-wide strip of ancient sea floor, brought to light in the uplift, its edge straight, harborless and quickly cliffed by the waves, the more to part the Jew from the sea. East of this smoother belt, beyond the cuesta of the Shephelah, lies the flat-rock plateau of Judea, 3,000 feet above the sea, its border cut by the rushing rains into the deep, crooked defiles that are the only path from below. Thus the Jews lay aside from the life of the world effectively a race set apart.

"In Judæa . . . many a village and almost every hilltop brings with it a sense of space and of being at the top of everything. . . Scores of other villages give rise to the same feeling. Perhaps it is in part imagination but my companion felt likewise. It cannot be wholly imagination, for our host evidently loved the view: and few men are so dull that they fail to be thrilled with some slight stir of feeling when they stand looking down on all the world at sunset."

After the charming narrative and mingled with it comes Huntington's new presentation of his doctrine of Dry Epochs. Unusual drought in the desert drives its nomad inhabitants for very life to the agricultural border land. Then civilizations are overwhelmed by hungry swarms of desperate men. Of old, thousands of years ago, climates were wetter than now, and the change came not gradually but in sudden decades of acute drought, followed again by centuries of moister years. Two of these crises of aridity fell in 1200 B. C. and 700 A. D., two periods of chaos in history for lands neighboring the desert. "Three eras make up the tale of history. Three great pulsations the course of climates during the same period. The eras and the pulsations agree in time. The first era comprises the hazy past when Egypt and Babylonia were at their greatest. It ends with the chaos of the Aramæan migrations. The second spans the life of Israel in Palestine, the Greeks in their islands and peninsula, Italy in the most western of the great lands of antiquity and Assyria and Persia far to the east. It also ends in chaos with the migrations of the Barbarians and the Mohammedans."

The plea for this doctrine will not convince everyone, but Huntington's readers have not in the past needed to be convinced to enjoy his writing. This book leaves us ready for more.

MARK JEFFERSON.

Persia in Revolution. With Notes of Travel in the Caucasus. By J. M. Hone and Page L. Dickinson. xiv and 218 pp., map and illustrations. T. Fisher Unwin, London, 1910. 2s. 6d.

Persia in Revolution is a brief and somewhat unsatisfactory account of a trip from Warsaw to Baku to Teheran, with an excursion into Trans-Caucasia.

The time is during the recent revolution in Persia and much attention is given to the relations of England and Russia to the political conditions of Persia.

Much is made of the difficulties of travel, more of the fantastical side of the revolution—some of which is not particularly clear or coherent—and the more interesting section of the volume is devoted to certain aspects of Persian life. Except in this latter section, the volume adds little of interest that is not generally known and has not been more fully described elsewhere in a more authoritative and appealing way.

R. E. DODGE.

AUSTRALASIA AND POLYNESIA

Melanesians and Polynesians. Their Life-Histories Described and Compared. By George Brown, D.D. xv and 451 pp., illustrations, appendix and index. Macmillan & Co., Limited, London, 1910. \$3.

The presence of a prior theory has availed to deform the arrangement of Dr. Brown's presentation of his material, but his honesty as a primary observer is so ingrained that the most minute and intimate scrutiny fails to disclose a single instance in which the prejudicial theory has marred the accuracy of his record of things which have come under his own eye. Dr. Brown's prejudice is that the black race and the brown race of the Pacific are one in source. The unity of the widely extended brown Polynesian race is well established and wholly accepted. We are forced to acknowledge, however, that we use the designation Melanesian only as a provisional and descriptive term; we have no evidence that the folk are single in race between New Caledonia and New Guinea, and there is good reason to suppose that the Melanesian name covers at least two black races and areas of intermixture of the two, the whole overlaid, as I have elsewhere shown at length, with later contamination of the migrant Polynesians. To adjust his observations to this theory of unity Dr. Brown has split each of his chapters by a warning dash into the Melanesian record and that derived from Polynesia. For each topic he qualifies as a competent witness. He served the missionary life in Samoa for fourteen years from 1860; in 1875, he was the first man to open to knowledge the Duke of York Group and adjacent coasts of New Britain and New Ireland; in 1879 he began his acquaintance with the Solomon Islands. His theory makes his book awkward, but it has had no discoloring effect upon the record of observation whether it come before or fall after the dash.

His Samoan notes have the advantage of a more unsophisticated society than is recorded in Krämer's great monograph; they are to be associated with Turner's study of that people, and they by turns corroborate, correct and supplement his former colleague. In the Melanesian section we find evidence that Dr. Brown has not made himself familiar with the recent work which has shed a bright light on the Gazelle Peninsula in Neu-Pommern (New Britain) and upon the black shore of Neu-Mecklenburg (New Ireland) facing Mioko at which he was so long stationed. We gain by this rather than suffer loss, for it affords a measure by which to compare his observation and to find it true. Ethnographers, therefore, may place full credence in this volume as an exact and independent record of Samoa, of the islands and littoral of St. George's Channel, of the Shortland Islands in the Solomon archipelago and of certain parts of the Louisiades and the adjacent shore of New Guinea. Students of the South Sea would have felt it a distinct loss if this venerable observer had neglected to publish this volume.

WILLIAM CHURCHILL.

EUROPE

Le Var Supérieur. *Étude de Géographie Physique.* Par Jules Sion, Docteur ès lettres. xi and 96 pp., 8 illustrations, and bibliography with 72 entries. Armand Colin, Paris, 1909. Frs. 3.

The Var is a relatively small river draining the French slope of the Maritime Alps and emptying into the Mediterranean a few miles from Nice. After elucidating the structure of the district the author discusses the development of the upper valley of the Var. Its abrupt turn from a southerly to an easterly course he finds is due to the capture by the latter of the former section of the river, originally draining to the west. Subsequent chapters are devoted to a discussion of the terraces of the Var followed by a description of the present valley system. The final chapter treats of the deforestation of the area, begun on a large scale in the sixteenth century but mainly practiced during the lawless period of the French Revolution. The result is only too evident in the bareness of the slopes and the washing away of the soil, conditions which the Service du Reboisement, instituted in 1882, finds difficult to remedy, as the Service is forced to purchase the desired territory piecemeal of its present owners, who are almost rendered destitute by thus being deprived of the pastures for their flocks on which they depend for their subsistence. W. L. G. J.

EDUCATIONAL GEOGRAPHY

Broad Lines in Science Teaching. Edited by F. Hodson, Ph.D., B.Sc., with an introduction by Prof. M. E. Sadler, M.A., LL.D. xiv and 267 pp. The Macmillan Co., New York, 1910. \$1.25.

The book includes twenty-one chapters devoted to varied phases of science teaching. Among general problems considered are the following: The Place of Science in the School Curriculum, The Place of Hypotheses in Science Teaching, The Claims of Research Work and Examinations, Science Teaching and the Training of the Affections, Science Teaching and a Child's Philosophy. The special subjects considered are Nature Study, Biology, Hygiene, Mathematics, Physics, Geography, History, Economic Science, Domestic Science, Chemistry, Agriculture, Engineering and Physics.

The volume is a symposium of expert opinions and in consequence the ideals and principles proposed in the several chapters seem to lack a certain advisable unity of aim. In spite of this lack, which is felt sharply in certain chapters, the book is most suggestive, even to a specialist in one field. In general, the authors agree in advocating that science in schools should be closely related to daily life—a point of view that has been much discussed in America in recent years and which has been most effectively promoted by teachers of physics.

The special chapter on geography teaching is not particularly suggestive as it does not consider the larger problems of how to teach geography to children. It advocates an early emphasis of physiography in the English sense, followed by regional geography in which the physical features receive proper attention in a causal order. As a field of work for secondary pupils, this phase of geography teaching has been much neglected in American schools and is just beginning to receive some attention. The chapter in question, however, adds little that will help in a better formulation of real geography in secondary schools, and is too general in tone to be really constructive. R. E. DODGE.

MATHEMATICAL GEOGRAPHY AND CARTOGRAPHY

Höhenschichtenkarten. Studien und Kritiken zur Lösung des Flugkarten-problems. Von Dr. Karl Peucker. Sonderabdruck aus der *Zeitschrift für Vermessungswesen*. Jahrgang 1910. 59 pp., 4 figures and 1 colored plate. Konrad Wittwer, Stuttgart.

This paper, which is nominally intended to offer a contribution to the problem of maps for aeronauts, is far more comprehensive than its sub-title implies. After detailed critical review (pp. 3-32) of previous methods of representing relief on maps by gradational color schemes the author presents a summary of the system he first developed in his treatise on "Schattenplastik und Farbenplastik," Vienna, 1898, which is based on a rational adaptation of the color sequence of the spectrum. The present paper is accompanied by a highly suggestive map showing the application of the author's method to a section of the Austrian map of Central Europe, 1:200,000, which he himself characterizes as the first complete application of his principles. The solution he offers of the general problem of plastically representing relief he also believes to be the right one in the preparation of maps for aeronauts.

Whatever subsidiary criticisms of Peucker's method may be, his lasting contribution to cartography is that he has supplanted subjective and arbitrary methods by a rational and scientific principle. W. L. G. J.

PHYSICAL GEOGRAPHY

Meteorology Practical and Applied. By Sir John Moore. Second revised and enlarged edition. xxvii and 492 pp., III pls., 98 figs. Rebman Limited, London, 1910.

It is a good sign when a book on meteorology, like that of Sir John Moore, goes into a second edition. The volume is not adapted for use as a text-book in teaching, hence its sale must be practically altogether among the great body of "general readers" who have an interest in weather, and are anxious to know something about its controls. Sixteen years have elapsed since the publication of the first edition, and, as was to be expected, the new book is both "revised and enlarged." *Meteorology Practical and Applied* is clearly the work of a practicing physician who has many interruptions in the pursuit of his "hobby," if the latter term can really be applied properly to a subject which is as closely related to a man's profession as meteorology is related to medicine. Sir John Moore's book is evidently the outgrowth of the author's keen interest in meteorological conditions, and in the relation of these conditions to health and disease. He has read over a fairly wide range of subjects, but almost altogether in English, and his chief source of information has been the *Quarterly Journal* of the Royal Meteorological Society. Excellent as that journal is—and its usefulness is steadily increasing—one would hardly wish to be dependent upon it as the sole, or even the chief, authority for the progress of meteorology. It is along this line that meteorologists will probably feel most disposed to criticize Sir John Moore's book.

We have said that the book is not well adapted for use in teaching, being rather loosely put together, and very uneven in its treatment of important subjects. It differs from most text-books on meteorology in the amount of space which is devoted to Climate (there are two chapters on climate, and two on the climate of the British Isles), yet it cannot be said that even these chapters are

satisfactory. The author's medical interests are clearly reflected in his discussion (Part IV) of "The Influence of Season and of Weather on Disease," in which many facts are brought together, chiefly scattering British observations.

It is, of course, rather unfair to criticize too harshly a book by an author who does not pretend to be a meteorologist. Yet a volume on meteorology is, after all, a volume on meteorology, and as such must be subjected to favorable or unfavorable comment. Our author, it should be said, protects himself in his opening statement, that "the writing of this book has been to me a labour of love," yet in the second paragraph of his preface he adds that "the physician of all men has the fullest opportunities of observing the far-reaching influence of weather and climate upon human health, happiness and longevity." It is unfortunate that Hadley's explanation of the deflective effect of the earth's rotation (pp. 4-5) should be given as if it were complete and accurate; that (p. 5) the expression "these winds must make for that centre so as to fill up its vacuum" should be used (a similar reference is made to a vacuum on p. 157); that there should be so inadequate an explanation of the diurnal variation of the barometer, without any reference to the important researches of Hann, Margules and others; that there should be so very superficial a treatment of cyclones and anticyclones, with practically no mention of the general circulation of the atmosphere, although the trades are mentioned, and, we regret to say, the "anti-trades," meaning the westerlies.

In many respects the book is up to date, as in the new chapter on the upper air. It is, however, behind the times in the matter of forest meteorological observations, although, we are very glad to say, ahead of the times in referring to Professor C. F. Marvin, of the U. S. Weather Bureau, as "the late Professor Marvin." On page 260 Prof. F. W. Very is referred to as Prof. F. W. Verz. The book is particularly strong in its descriptions of instruments, a large number of which, it may be said, are practically, or wholly, unknown in this country.

R. DEC. WARD.

GENERAL

Statistique Annuelle de Géographie Comparée. Par Jean Birot, Agrégé de l'Université, Professeur au Lycée Carnot. 6me Année 1910. Hachette et Cie., Paris. 32 pp.

An invaluable little publication (Cf. *Bull.* Vol. 40, p. 179). Based on the official statistical publications of the various countries, the leading statistical journals and such publications as the Statesman's Year Book and the Almanach de Gotha, this pamphlet of 32 pp. contains a compact summary of the world's statistics of value to the geographer. Its contents are divided as follows:

[I] Population: (a) of the world, (b) by countries; [II] Agriculture and Industries: (A) Foods, classified as of mineral (i. e. salt), vegetable and animal origin, (B) Textiles, of vegetable and of animal origin, (C) Fuels, (D) Minerals; [III] Commerce: (A) Transportation: (1) Navigation, (2) Railroads, (B) Postal and Telegraph Service, Telephones, (C) Value of Commercial Transactions (export and import), [IV] Finances; Army and Navy. In each subdivision of section II and in section III A, additional statistics are given for France, but otherwise the information is well co-ordinated. In sections I, II and IV enumeration is necessarily by countries, in section II by products, classified according to the country of their origin. Section Ib gives the population of each country, its density, the population of its major subdivisions and of its larger cities. Section III A 1 gives the tonnage cleared at the principal

ports of the world. Section III A 2 gives statistics of the five Alpine tunnels, including the Lötschberg.

The value of this publication lies in the fact that it has been compiled from the geographer's point of view. It renders the statistics of interest to the geographer immediately available, and, therefore, within its limits does away with the necessity of consulting such compilations of original material as abstracts, yearbooks, etc., which contain a great deal of matter irrelevant to the geographer.

W. L. G. J.

Geographen-Kalender. In Verbindung mit vielen Fachgenossen herausgegeben von Dr. Hermann Haack. Neunter Jahrgang 1911. Justus Perthes, Gotha. vi and 824 pp. 6 M.

The present edition of this indispensable book of reference for geographers contains the directory of geographers (pp. 281-693), which alternates with the list of geographic institutions published every other year. The only departure from previous usage is the omission of the maps from the present edition. Lack of time to revise the maps, which were mainly excerpts from Stieler's Hand-atlas, in conformity with the results of new explorations, together with the additional expense, are, according to the editor, responsible for their omission. The Kalender is prefaced by a biography (pp. 2-35) of the Argentine geographer, Francesco P. Moreno, Gold Medalist of our Society, by Bailey Willis, in English and German. The latter version, which evinces a quite exceptional mastery of the language, is also from his pen, and is an instance of the relative insignificance to the man of broad mind of so small an obstacle as the acquisition of a foreign language. The remainder of the book is devoted to the usual departments: astronomical tables, (pp. 39-67), record of current events, (pp. 71-109), explorations, (pp. 113-143), geographic literature of 1910, (pp. 147-253), necrology, (pp. 257-275), advertisements (pp. 699-784) and table of contents and index, (pp. 789-819).

W. L. G. J.

La Géographie Humaine. Essai de Classification. Positive principes et exemples. By Jean Brunhes. iv and 843 pp., illustrations and maps. Félix Alcan, Paris, 1910. Fr. 20.

Professor Brunhes's work makes no attempt to define human geography, but he makes it very clear that it consists of material facts, things visible and photographable. The spirit of geography indeed is to get one's eyes open and learn to see. As this is difficult, he gives abundant illustration in concrete examples of how one tries to see and what one looks for.

The work is in the main a collection of geographic monographs, worked out in the effort to show what a geographic study should consider. Though his publisher lists his work under History (!) Brunhes is careful to draw the line between geography and history. What men have recorded of the past may, he says, shed light on the present, but the geographer's main occupation is with the facts as he may see them to-day. He will hardly deal satisfactorily with them as a geographer unless he examines them himself in the open air where they occur.

The psychologic element that enters into geography is determining. The natural environment is pure geography, a pine forest for instance; but whether the visible human-geographic facts that result are wigwams and trails or furniture factories and railroads depends on the minds of the inhabitants. He seems to find such a work as Miss Semple's inclined to attribute overmuch, per-

haps, to geography and too little to the psychologic factor. Old time historians, on the other hand, were too ready to form superficial conclusions. "History is wrought out on the earth, but it is made up of elements that are most complex, mixed and remote from elementary geographic considerations. The profound influence of geography on the evolution of human society is to be explained by intermediary facts, facts of the second order, tillage, pasturage, etc., and facts of the third order, facts of social geography" (p. 59). Michelet is therefore a horrible example. "One must begin at the beginning with less ambitious and more modest labors."

He classifies the human-geographic material, that must be patiently examined into three groups—six types—of "essential facts." The first are facts of unproductive occupation of the soil. Houses and roads are the items in mind, and for the first, at least, its intimate geographic character is admirably shown in the monographs which make up the body of the work. The author is careful to point out that his work is not a treatise. Any American could at once supplement his account of wooden houses, as the author knows them in north Europe; anyone who has seen the Norwegians building their highly refined log houses, that suggest when finished the American frame dwelling to which they have no structural likeness, could amplify the account there. But Brunhes does give an admirable geographic account of the wooden house and its shingles in the forests of the north, its replacement by buildings of earth and brick on the treeless steppes and its substitution by brick and stone when destroyed by the constant enemy, fire—geographic, since the environment offered an invitation that man accepted. So in the Mediterranean realm a new landscape of rocky ridges is accompanied by a new house-type. From the house comes the village and the city. Types are described from the regions of the author's personal knowledge, roughly the extent of the old Roman Empire. It is not, therefore, the geography of the house, but what influence geography has had on house building in Germany, Switzerland, Italy, Spain, Algeria, Egypt and Syria. These bits are admirable. The author has illustrated them with photographs of his own taking with detailed legends, showing wherein they illustrate.

The second group of essential facts is "facts of vegetable and animal conquest," which means domestication. For the plants, especially, this plunges us at once into a study of the suitable environment. With Köppen's climate work as a basis, he proposes a new division of world-zones; he has already declared that the two fundamental maps for human geography are those of rainfall and distribution of people. Now he divides the earth into five contrasted zones: boreal forests, equatoreal forests, hot-and-cold deserts, always-cold deserts and steppes. Between these lie transition zones and there lives man (p. 316). The transitions are not merely of temperature but also of humidity. Perhaps the best passages in this geography of cultivated plants is the outline of an account of cotton culture in a later chapter on things pedagogical, an ideal method of presenting a topic in commercial geography (p. 721).

It would be interesting to know the evidence that the potato, maize and tobacco have been cultivated for 2,000 years. Fortunately the author does not hold closely to his scheme of classification. His book is a mine of interesting bits told "en passant." A table shows wheat harvests somewhere on the globe in every month of the year. Sheep, demanding wide space for economic raising, diminish in numbers in new countries as the population grows (p. 375). Nomadism is well established as geographic, since it depends on a certain environ-

ment, not on a stage in history, yet the psychologic factor appears (p. 394). In nomadic Algeria horses are less and less bred. Formerly the horse was a valuable aid in pillaging. But the stable French government has made pillage unprofitable, so the horse is not bred. So of old the nomads invaded the sown land every season of drought, and produced a border of unsafe, neglected plowland near the desert. Under good government this is occupied by agriculture and nomadism appears to be on the wane. Too hasty conclusion might suggest that the climate is becoming moister. Conversely, the overthrow of good government allows nomadism to drive back agriculture, producing the appearance of more arid climate. This is of course of interest in connection with Dr. Huntington's studies of climate fluctuations in the East, which Brunhes seems not to know. He warns against the neglect of the psychologic factor at every turn. The essays on the Fang in the French Congo, the inhabitants of the Algerian oases, the Souf and M'zab, and the perpetual migration of the people of the valley of d'Anniviers in Valais well repay reading.

A third group of essential facts is "facts of destructive economy," man's exhaustion of forests, animal species and mineral deposits. This leads to an interesting account of the human geography of coal.

Professor Brunhes's work is rich in geographical material. His geography is not a science of relations but a subject of study and a most interesting one. The earth is its topic and only when the adjective human is added does man come into the story.

MARK JEFFERSON.

Nautical Science in its Relation to Practical Navigation, together with a Study of the Tides and Tidal Currents. By Charles Lane Poor. xi and 329 pp., illustrations and index. G. P. Putnam's Sons, New York and London, 1910.

The work falls into three rather disconnected parts. The first of these gives an elementary account of the earth and the solar system apparently for "rule of thumb" navigators, who may be familiar with some processes but few principles of navigation. The sketch is not limited to things bearing on navigation but is very slight and in very simple language. In the account of Foucault's pendulum the explanation is the familiar but unsatisfactory reference to the "lagging" of a south-bound body behind the faster moving earth of the southern end of its swing and "running ahead" on going north. If Prof. Poor should swing his pendulum east and west it would still "deviate" to the right, as he is aware, though performing its whole swing in the same latitude. Another third of the book deals with matters of navigation, finding time, latitude and longitude at sea. The history of Sumner lines and the account of their importance is good. The attempt to dispense with mathematics rather collapses when several forms of the equation for solution of hour angle are introduced. Here they are quite out of place. A trigonometry or a spherical astronomy would develop them and transform them, and, after all, what can be simpler than that? Is not a good mathematical treatise the simplest possible means of getting at mathematical results and understanding them?

Last comes an excellent account of tides as local oscillations of the ocean, and of tide-predicting machines. Dr. Harris's part in the discovery of the local character of tides is overemphasized. As the present reviewer noted in the *National Geographic Magazine* just before Dr. Harris's papers were published, the oscillation of the Atlantic was detected nearly a century ago by Young and Whewell and Fitzroy. As to the cause of the tide our author makes a good

point when he emphasizes the importance of horizontal forces as compared with vertical ones in efficiency for raising tides, but has lost an important advance in popular statement when he failed to utilize the Davis-Darwin doctrine of centrifugal force partly balancing the moon's attraction. Still the 80 pages on tides are clear and fairly new.

MARK JEFFERSON.

NEW MAPS

NORTH AMERICA

U. S. COAST AND GEODETIC SURVEY MAPS

ALASKA. Sketch of General Progress, U. S. Coast and Geodetic Survey, June 30, 1910. 1:5,000,000 (78.90 miles to an inch). Black. Accompanies Report of Supt., C. and G. S., 1909-10. [Symbols for gravity stations, latitude, longitude and azimuth determinations, tidal and magnetic observations, areas covered by triangulation, topographic and hydrographic surveys, lines of deep-sea soundings.]

HAWAIIAN ISLANDS. General Progress Sketch, U. S. Coast and Geodetic Survey, June 30, 1910. (1:2,000,000 approx. [31.56 miles to an inch].) Black. On part of plate including Porto Rico. Accompanies Report of Supt., C. and G. S., 1909-10. [Hawaiian Government Surveys included; indicates areas covered by triangulation, topographic and hydrographic surveys, lines of deep-sea soundings, and stations of which longitudes have been determined by telegraph.]

PHILIPPINE ISLANDS. Sketch of General Progress, U. S. Coast and Geodetic Survey, June 30, 1910. Mercator Projection, 1:5,000,000 in lat. 13° N. Black. Accompanies Report of Supt., C. and G. S., 1909-10. [Same symbols as on corresponding map listed under Alaska.]

PORTO RICO. General Progress Sketch, U. S. Coast and Geodetic Survey (June 30, 1910). (1:675,000 approx. [10.26 miles to an inch].) Black. On part of plate including Hawaiian Islands. Accompanies Report of Supt., C. and G. S., 1909-10. [Shows areas covered by primary and secondary triangulation and by topographic and hydrographic surveys.]

UNITED STATES. Sketch of General Progress, U. S. Coast and Geodetic Survey, June 30, 1910. 1:5,000,000 (78.90 miles to an inch). Two sheets. Black. Accompanies Report of Supt., C. and G. S., 1909-1910. [The current edition of this map, which is revised to date every year. It indicates areas covered by primary, secondary and reconnaissance triangulation and by topographic and hydrographic surveys, and shows lines along which deep-sea soundings have been taken and geodetic leveling has been done.]

UNITED STATES. Four base maps of the United States, 1:7,000,000 (110.46 miles to an inch) showing, in red: (1) Distribution of the Principal Astronomic Stations Occupied by the U. S. Coast and Geodetic Survey for Latitude, Longitude and Azimuth to June 30, 1910; (2) Positions and Connections of Telegraphic Longitude Stations from 1846 to June 30, 1910; (3) Routes of Geodetic Spirit Leveling and Positions of Gravity and Tide Stations to June, 1910; (4) Positions of Magnetic Stations Occupied to June 30, 1910. Accompany Report of Supt., U. S. Coast and Geodetic Survey, 1909-10.

U. S. HYDROGRAPHIC OFFICE CHARTS

Pilot Chart of the North Atlantic Ocean, May, 1911. On reverse: Method for Determining the Position of a Vessel in Sight of a Fixed Point, by Capt. N. Marcantetti.

Pilot Chart of South Atlantic Ocean, June, July, August, 1911.

Pilot Chart of South Pacific Ocean, June, July, August, 1911.

Pilot Chart of the North Pacific Ocean, July, 1911.

PORTO RICO. (Maps of Porto Rico, 1:1,000,000 approx. [15.78 miles to an inch] showing): I. Mean Annual Temperature and Prevailing Direction of the

Winds; II. Average Annual Extremes of Temperature; III. Average Annual Rainfall (five degrees of density). Accompany "The Climate of Porto Rico" by O. L. Fassig. Reprinted from "The Register of Porto Rico for 1910."

SOUTH AMERICA

ARGENTINA. Croquis-Itinerario desde Rosario de Lerma hasta Cachi, construido por Franz Kühn. 1:133,300 approx. (Region near 25° S. and 66° W.) Accompanies paper with similar title by the same author, *Bolet. del Inst. Geogr. Argentino*, Vol. 24, facing p. 50. With inset map "Bosquejo esquematico de orientacion." Relief in sketch contours.

AFRICA

BELGIAN CONGO. Carte du District du Katanga, Congo Belge, dressée par H. Droogmans, Secrétaire Général du Ministère des Colonies. 1:1,000,000 (4° 30'-14° 0' S.; 23° 40'-31° 45' E.). 2 sheets. Black. April, 1910. [A fundamental general map incorporating all that is known of the region it represents. In spite of its execution in one color it is entirely legible. Relief is broadly indicated by hachures. The routes of the Mission Scientifique du Katanga (Capt. Lemaire) and of the chief explorers of the region are shown. Mineral deposits are indicated, distinction being made between deposits of tin, iron, copper and precious metals.]

BELGIAN CONGO. Carte du Bas Congo dressée par H. Droogmans, Secrétaire Général du Ministère des Colonies. 1:100,000 (4° 10'-6° 3' S.; 12° 13'-15° 27' E.). 15 sheets. Black. Edition of April, 1910. [A new edition of this fundamental detailed map of the "panhandle" of the Belgian Congo lying W. of the meridian of Stanley Pool. The possibility of compiling so detailed a map of this region, of which a previous edition appeared in 1902, is due to its being traversed by the Leopoldville-Matadi Railroad circumventing the rapids of the Lower Congo. A rectangular co-ordinate system, of which 20° E. and the equator are the ordinate and the abscissa, forms the basis of this map. Sheet 15 contains an inset map of Stanley Pool.]

BELGIAN CONGO. Carte du Bas-Congo. 1:1,000,000. 2e Édition. Tableau d'Assemblage de 15 feuilles au 100,000 dressées par H. Droogmans, Secrétaire Général du Ministère des Colonies. (4° 0'-6° 10' S.; 12° 0'-15° 40' E.). Black. April, 1910. [Index map of the 15 sheet map of the lower Congo, 1:100,000.]

BELGIAN CONGO. (1) Map showing Mining Localities and Approximate Geological Boundaries in Belgian Congo. (2) Map of the Belgian Congo Showing Railroads and Mining Concessions. (Both maps in 1:23,500,000 approx. [370 miles to an inch]). Accompany paper read at Pittsburg, March 1910, on "Mining Conditions in the Belgian Congo" by S. H. Ball and M. K. Shaler, *Trans. Amer. Inst. Mining Eng.*, Vol. 2, p. 254. [Map 1 distinguishes between (1) lavas, (2) flat sandstone and shale of central basin and sedimentary rocks of coast, (3) granite and other igneous rocks, (4) folded sedimentary rocks and schists. Map 2 shows the boundary of the areas allotted to the various exploiting companies.]

BRITISH EAST AFRICA. Map of Africa, 1:125,000 (1.97 miles to an inch). Geographical Section, General Staff. Sheets South-A-37/V-II, 1910 (East Africa Protectorate: Mangua: 3° 0'-3° 30' S.; 39° 30'-40° 0' E.) and South-A-37/V-IV, 1911 (East Africa Protectorate: Takaungu: 3° 30'-4° 0' S.; 39° 30'-40° 0' E.). Surveyed under the direction of the Director of Surveys, East Africa Protectorate. Drawn and printed at the War Office, and photo-etched at the Ordnance Survey Office, Southampton. 5 colors, relief in contours ("form lines"), interval approximately 100 ft. Price 2/- a sheet. [The above two sheets represent a part of the coastal belt between Malindi and Mombasa. The great number of features delineated is quite exceptional in a map of so sparsely settled a country, the legend containing no less than 56 distinct symbols. Relief is in brown, drainage in blue, vegetation in green, culture in black and red. The representation of vegetation (separate symbols for forest, cocoanut palms, and bush and scrub) is a particularly welcome feature that might be

introduced to great advantage upon our otherwise so admirable topographic sheets. The execution of the map is excellent.]

THE CAPE OF GOOD HOPE. Geological Map of the Province of the Cape of Good Hope published by the Geological Commission. 1:238,000, or 3.75 miles = 1 inch. Sheet 11 (Clanwilliam: 31° 40'-32° 40' S.; 18° 0'-20° 0' E.) Geology by A. W. Rogers, E. H. L. Schwarz, A. L. Du Toit (described in Annual Reports of Geol. Comm. for 1900, 1903, 1904). 12 colors. Sheet 13 (Beaufort West-Fraserburg: 31° 40'-32° 40' S.; 21° 20'-22° 40' E.) Geology by A. W. Rogers and E. H. L. Schwartz (described in Annual Reports of the Geol. Comm. for 1896, 1900, 1902, 1910). 2 colors. [No representation of relief. Sheet 11 distinguishes between Superficial Deposits, Karroo System (3 series), Cape System (3 series), Ibiquas Series, Malmesbury Series, Intrusive Rocks; sheet 13 between sedimentary and intrusive rocks of Karroo System. The latter sheet includes part of the Nieuweveld Escarpment.]

CENTRAL AFRICA. (Map showing) Dr. Karl Krumm's Route (from S. Nigeria to Khartum) (1:22,500,000 [359 miles to an inch] 20° N.-0°; 5°-40° E.) *Scott. Geogr. Journ.*, Vol. 27 (1911), p. 226. [Also shows the routes of Capt. Boyd Alexander, 1904-07, and of Nachtigal, 1869-74.]

MOROCCO. Zone de 10 Kmètres Autour de Tétouan. 1:100,000. *Renseign. Col.*, 1911, No. 4, facing p. 90. [Relief in sketch contours.]

UPPER GUINEA. Carte Démographique de l'Afrique Occidentale Française. (1:13,750,000 approx. [about 215 miles to an inch] 20°-4° N.; 21° W.-9° E. of Paris.) *L'Afrique Franç.*, Vol. 21 (1911), p. 127. [Distinguishes between seven grades of density of population, using the administrative divisions of the "cercles" as units.]

ASIA

DUTCH EAST INDIES. (Map of the Island of Ambon and adjoining islands of the Moluccas) 1:250,000. Accompanies *Bijdr. tot de Taal-, Land- en Volkenkunde van Nederlandsch-Indië*, Deel 85, 1911, facing p. 337. [Gives bare outlines only; possibilities of so large a scale not utilized.]

DUTCH NEW GUINEA. Map to illustrate the expeditions of H. A. Lorentz, LL.D., in Dutch New Guinea, 1907-1909. 1:400,000, or 1 inch = 6.31 statute miles. (4° 12'-5° 0' S.; 138° 30'-139° 0' E.) *Geogr. Journ.*, Vol. 37 (1911), No. 5. With inset map 1:8,000,000, showing area of detailed map. 4 colors. [Relief in brown shading, drainage in blue, routes in red.]

INDIA. Volksdichte in der Oberen Gangesebene, auf Grund des "Census of India" vom Jahre 1901 entworfen und gezeichnet von Paul Böllert. 1:2,500,000 (39.46 miles to an inch.) *Pet. Mitt.*, I. Halbband, 4. Heft, Taf. 33. (30°-25° N.; 77°-87° E.) [Shows the limit of the Gangetic Plain and distinguishes between six grades of density of population, three above and three below the mean, using three tints of the same color to designate the two categories, respectively.]

MANCHURIA. Pestkarte der Mandschurei. Entworfen von Dr. Rudolf Pösch. 1:5,000,000 (78.91 miles to an inch). (55°-34° N.; 104°-140° E.) *Pet. Mitt.*, I. Halbband, 4. Heft, Taf. 35. [Shows centers, distribution and lines of advance of the recent and of former plague epidemics in Manchuria.]

PHILIPPINE ISLANDS. (a) Map Showing Relation of Recent Vulcanism to Principal Tectonic Lines; (b) (Geologic Map of Philippine Islands); (c) Map of Philippine Is. Showing Principal Mineral Districts and Distribution of Known Coal Fields. 1:10,000,000 approx. (157.83 miles to an inch). Black. Plates II, III, and V of "The Essential Features of the Geology of the Philippine Islands" by W. D. Smith, *Philipp. Journ. Science*, Section A, Vol. V, pp. 307-342, Manila, 1910. [Map b distinguishes between Alluvial areas, Tuff and conglomerates, Tertiary sedimentaries, Extrusive rocks, Complex of igneous and metamorphic rocks, Metamorphic rocks; Map c shows gold, copper, iron and coal districts.]

PHILIPPINE ISLANDS. Sulu Island. Based on Military Maps of Department of Mindanao 1901-1902 and the Observations of Dr. N. M. Saleeby. About 6

miles to an inch (1:380,000 approx.) Black. Plate II of "Geologic Reconnaissance of Mindanao and Sulu: II. "Physiography" by W. D. Smith. *Philipp. Journ. Science*, Section A, Vol. V, pp. 345-362, Manila, 1910.

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WESTERN AUSTRALIA. Geological Sketch Map of Western Australia by H. P. Woodward, Asst. Gov't. Geologist. Scale, 100 miles = 1 inch. (1:6,336,000). Black. Accompanies "The Geology and Ore Deposits of the West Pilbara Goldfield" by the same author, Bull. 41, Geol. Surv. of W. Austral., Perth, 1911. [Valuable general geologic map of Australia west of 129° E. Distinguishes between (1) Recent and Tertiary, (2) Mesozoic, (3) Paleozoic, (4) Metamorphic (a) sediments, (b) greenstones, and (5) Granite and Gneiss. It also shows the "rabbit-proof fence" extending entirely across the continent in a meridional direction from near the mouth of the DeGrey River on the north coast to the south coast in 121° E.]

WESTERN AUSTRALIA. Geological Sketch Map of the West Pilbara Goldfield by H. P. Woodward, Asst. Gov't. Geologist. Scale, 6 miles = 1 inch (1:380,160). (20° 10'-21° 50' S.; 116° 5'-118° 40' E.) Accompanies paper with analogous title by the same author. Plate I of Bull. 41, Geol. Surv. of W. Austral., Perth, 1911. [Distinguishes between (1) Alluvium, (2) Lavas, Sandstones and Conglomerates (Nullagine Series), (3) Granite, (4) Schists and Slates, (5) Dolerites, Gabbros, Serpentine, and indicates gabbro dykes and banded cherts. Knowledge of the chronologic sequence of formations of this district too scant to allow of classification on a formational basis.]

WESTERN PACIFIC OCEAN. Approximate Tracks of the Typhoons and Depressions (in the Western Pacific Ocean) of September, 1910. Mercator Projection, equatorial scale 1:18,000,000 approx. (38°-7° N.; 100°-150° E.). Accompanies *Bulletin* for Sept. 1910, Weather Bureau, Manila Central Observatory, Manila, P. I., 1911.

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WORLD. Erdkarte der Ausbreitung der Pest am Ende des 19. und am Anfang des 20. Jahrhunderts. Entworfen von Dr. Rudolf Pösch. (Mercator Projection, equatorial scale, 1:80,000,000.) *Pet. Mitt.* I. Halbband, 4. Heft, Taf. 34. [Shows ancient endemic plague centers, present distribution of epidemic plagues, occurrences of plague with their date, principal routes of navigation serving to transmit the plague.]

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Vol. X. Crustaceans. By Mary J. Rathbun, Harriet Richardson, *et al.*

Vol. XI. Nemerteans, by Wesley R. Coe; Bryozoans, by Alice Robertson.

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SOUTH FRONT OF THE AMERICAN GEOGRAPHICAL SOCIETY'S BUILDING.
Shows the main entrance and the relation between the main building and the stack house containing the library.

BULLETIN

OF THE

AMERICAN GEOGRAPHICAL SOCIETY

Vol. XLIII

1911

No. 7

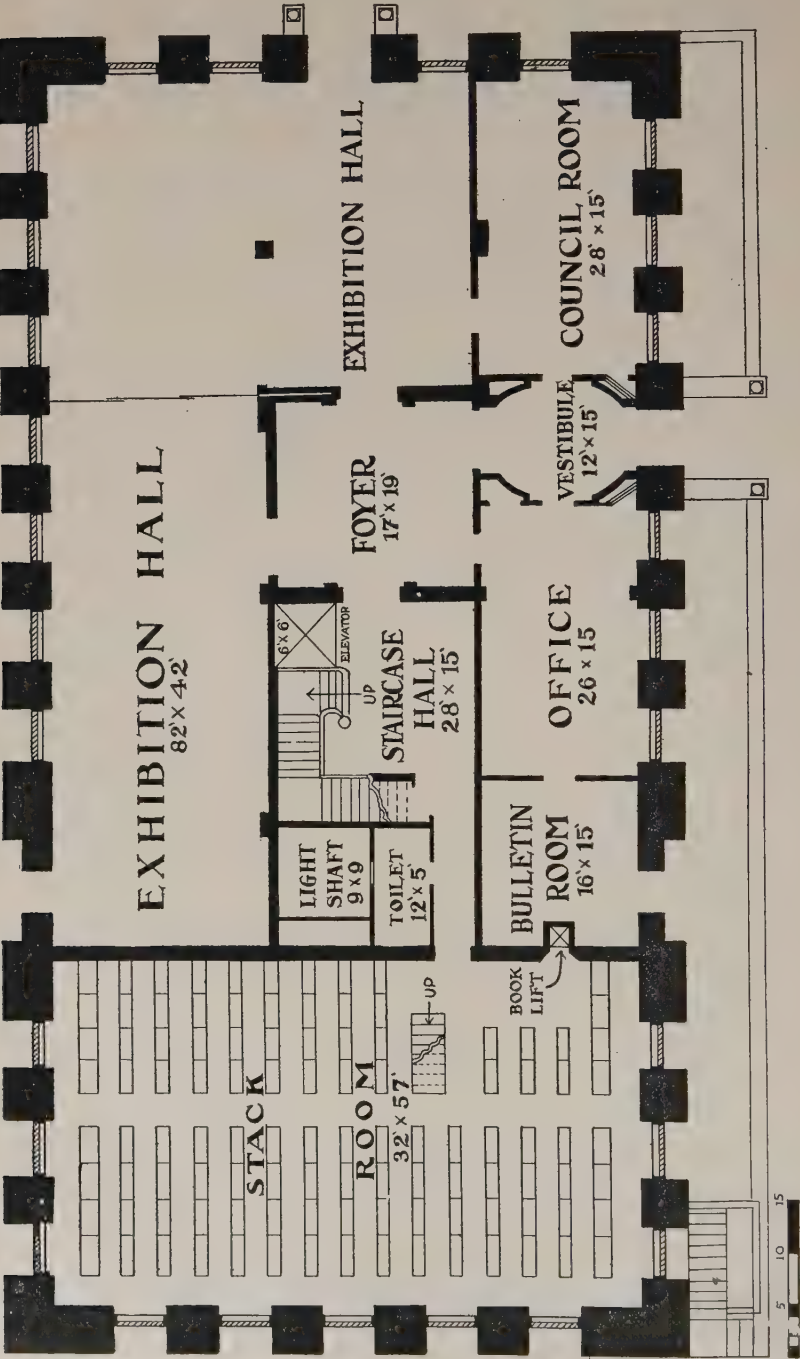
THE NEW HOME OF THE AMERICAN GEOGRAPHICAL SOCIETY

The working staff of the Society was installed in its new building, Broadway at 156th Street, on Monday, May 15. The Society's collections had been in course of removal for about a month.

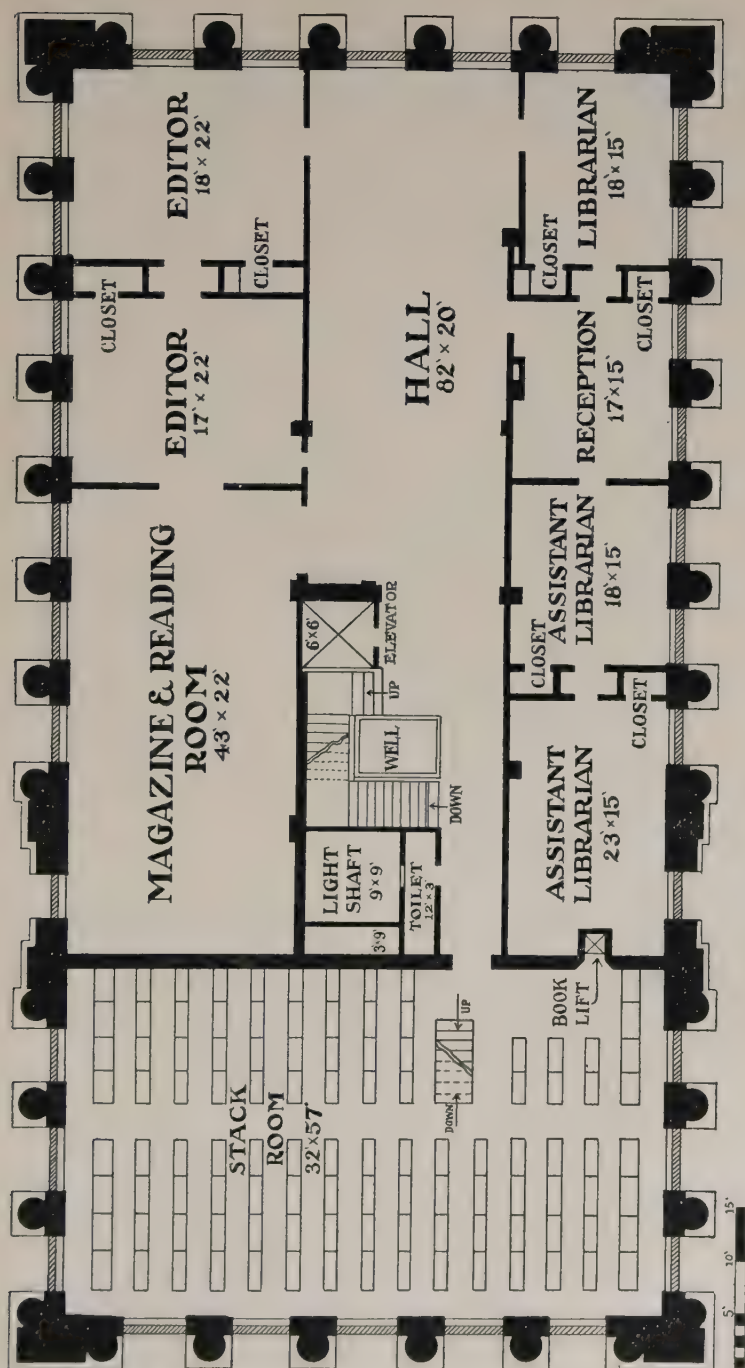
In view of the wide interest which our members and geographers generally have expressed in the erection of this beautiful and commodious structure, a few illustrations are given here of its exterior, with plans of all the floors of the main building excepting the basement and of four of the six stack floors; together with a brief description of some of the more important features of the building.

As the *Bulletin* has already mentioned, the building occupies a part of the old-time Audubon Park. To the west of it are the fine buildings of the Hispanic Society of America, The American Numismatic and Archæological Society and the Spanish Church of Our Lady of Guadalupe. Just beyond is Riverside Drive, the Hudson River and the wall of the Palisades in the background. In an overcrowded city no more ideal spot could be found for a center of scientific activity than on this beautiful plateau.

The building has a frontage of sixty-five feet on Broadway and 125 feet on 156th Street. The main entrance is on the south side, reached from Broadway through a wide court. Built entirely of Indiana limestone, the structure is in the style of the Italian Renaissance, conforming in architectural design with the other buildings on the grounds. It has four stories and a basement, the latter extending under the entire building, and affording large space for the storage of publications, map-plates and supplies, the boiler-room, heating plant, work-shop, rooms for the caretaker, etc.



FIRST STORY. THE OFFICE FLOOR.



SECOND STORY. EDITORIAL AND LIBRARY STAFF.

The name of the Society is chiseled on the Broadway front of the building. On the three other sides are twenty-five spaces for the names of distinguished explorers and geographers. Thus far twenty-three names have been cut into the stone, leaving two spaces still unassigned. The names are:

SOUTH	NORTH	WEST
Strabo	Hudson	Champlain
Ptolemy	La Salle	Vespucius
Marco Polo	Mercator	Livingstone
Columbus	Cartier	(two spaces
Magellan	Balboa	unassigned)
Da Gama	Baffin	
Humboldt	Coronado	
Dias	Drake	
Cabot	Ritter	
Davis	De Soto	

The entire western part of the building is given to the six stack floors, which have a storage capacity about five times as large as that of our former accommodations. Between the stack floors and the main building is a fire wall of brick twenty inches thick. The metal doors through which the stack floors are reached from the main building are supplied with combination locks. The floors on which the book stacks stand are of plate glass, the stacks are of cast iron with silver finish, and the shelves of corrugated steel. No wood enters into any part of the construction. All the book shelves are vertically movable at inch intervals. The first, third and fifth stack floors are connected by the metal doorways with the office, editorial and map floors respectively, of the main building. The second, fourth and sixth stack floors are mezzanine floors or *entresols*, which have connection with the floors of the main building by the stairways that lead from the bottom to the top of the stack floors. Near the book-lift doors are electric buttons for turning on the light in any of the stack floor corridors; and local buttons are in each narrow passage between the stacks for lighting the small section of shelves to be consulted. On bright days there is little need for electrical illumination, as the skylights, and windows on three sides, supply all the light required.

A feature of much convenience in the main building is the large amount of book shelving and the number of drawers and enclosed shelves with drop doors in all the work rooms. In the two editorial rooms on the second floor, for example, there are 293 linear feet of book shelves; and in the two large closets opening from these rooms and in the passageway between them are twenty-four enclosed shelves and six drawers. The book shelves in the various work-rooms give



THE BROADWAY FRONT.

Shows the situation of the building relative to the buildings of the Hispanic and Numismatic Societies.



THIRD STORY, MAP FLOOR.

space for practically all the reference books in the library. The abundance of enclosed shelves keep in classified order and protected from dust, the large variety of material required in the regular work of the house. Some of these enclosed shelves in the map department are long enough to hold wall maps on rollers till they are catalogued and ready to be placed in the collections.

The large metal book-lift, operated by electricity, connects the basement with each of the six stack floors, and also with the first, second and third floors of the main building. If the lift is to be moved to any one of these floors, the appropriate button is pressed and the lift stops at the floor designated; and not till it stops can the doors opening into the lift be opened. If the buttons on two or more floors are simultaneously pressed, the lift does not move.

Terrazzo, mixed cement and small marble fragments, three inches thick, practically indestructible and almost noiseless, is the substance of which the floors are composed throughout the main building, excepting that the floor of the fourth story is cement alone and, in the vestibule and foyer, terrazzo is used in tasteful designs, with Norwegian and Tennessee marble. The stairways are of Norwegian marble and the floor of the main hall, second story, is bordered with the same material. All the window frames, shelving, etc., on the four floors of the main building are of quartered oak. A house telephone connects all the work-rooms and distance telephones are installed on the first and second floors.

The normal heat required in all the rooms and halls is fixed at 72° F. When the heating plant is in use, if the temperature rises above or falls below the standard in any room or hallway, the fact is automatically reported to the heat regulating appliance in the basement, and more heat, or less, is automatically directed to the room whose temperature has varied from the standard.

The accompanying plans show clearly the arrangement of the floors, and little need be added by way of explanation. The doors dividing the exhibition hall into two parts (1st floor) all run into the slit indicated on the plan by a white line, disappearing entirely from view, and the whole finely lighted space will serve well for exhibitions of maps and other geographical material. Closing these partition doors, the narrow part of the hall will provide about 200 sittings, and be well adapted for such scientific lectures as do not require large halls.

The rooms for the editorial and library force—second story—as now assigned and marked on the plates, may be changed to serve the convenience of the work, but in the main the present arrangement



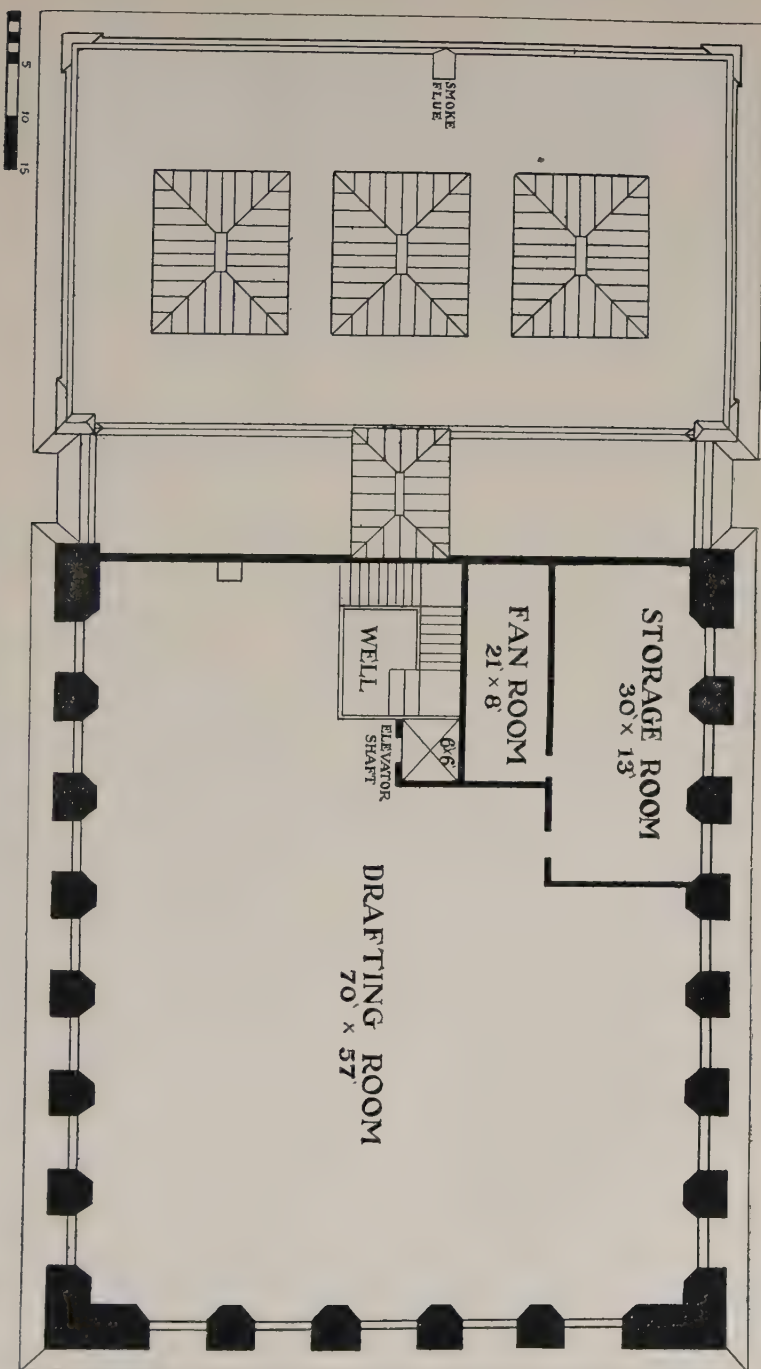
MAIN HALL.

In its unfurnished state. The front of the hall does not appear in this view. The open doors give glimpses of one of the stack rooms (in the rear) and of the magazine and reading room on the right. The stairway connects all the floors. The elevator door is in front of the stairway.



A STACK ROOM.

Shows one of the corridors and the book-stacks bordering it.



FOURTH STORY. DRAFTING FLOOR.

will doubtless be preserved. The magazine and reading room is a perfectly lighted apartment, with ample room to lay out the latest issues of all our exchanges from foreign societies, and with adequate and comfortable accommodations for readers. The current publications are also within easy reach of the editorial and library rooms. The cataloguers occupy the large room adjoining the book-lift.

The map floor, occupying the third story, has about seven times the storage capacity for maps and atlases hitherto provided. Rows of dust-proof cases extending across the map room contain maps in sheets. The collection of historical and other atlases is in the atlas room. Atlases most needed in the daily work of the Society are in magazine and reading room on shelves above which the current publications are arranged; a few also are in the work-rooms.

The drafting floor, fourth story, with skylight roof above it, could probably not be improved for map-drawing purposes. It offers every advantage for the development of a superior map-drafting department. The fan room is the lungs of the complete ventilating system, which is designed to supply pure air at all times to every part of the building. The space at the left of the light shaft, in three of the plans, is reserved for the ventilation pipes connecting with the fan room.

It is unnecessary here to speak in any detail of the handsome and tasteful fittings and finish of the interior. The house is lighted by electricity, which also runs the passenger elevator. A month's occupancy has more than confirmed all expectations as to the convenience, comfort and complete adequacy of this beautiful structure for the purposes and needs of a geographical society. The work-rooms are large, ceilings high, ventilation perfect, light abundant, and the atmosphere of every room and floor is cheerful and inviting. The basement is so light that artificial illumination there will seldom be needed.

In brief, this great enlargement of the facilities of the Society was planned and has been carried out on a scale that lavishly provides for the growth of our collections and of the Society's work for generations to come.



BROADWAY AND 156TH STREET FRONTS.

PHYSIOGRAPHICAL FEATURES OF ICELAND

BY

W. S. C. RUSSELL

The coast line of Iceland is extremely irregular and is characterized by deep fiords and precipitous cliffs, snow-capped and glacier-scarred. The southern coast from Vestrahorn west to Reykjanes is a broad arch bending southward bordered by vast reaches of volcanic sand mingled with diluvial deposits, especially in the broad delta of the Markarfljöt. The outer portion of this delta is fringed with a low reef of volcanic sand, mostly from Hekla, which changes with storm and tide in a treacherous manner. On the west coast, the Reykjanes peninsula and Snaefells Jökull enclose the great expanse of Faxafjord. North of Snaefells is Breidifjord, dotted with numerous islands. The northern coast is deeply cut by many magnificent fiords which receive the torrential rivers from the northern watershed. On the east, the fiords are more numerous but extend less deeply into the land.

The great central plateau is marked by a line of glaciers which are separated by sandy wastes and vast acres of glacial debris. Láng Jökull in the west, Hofsjökull in the center and mighty Vatna Jökull in the east are the remnants of the glacial cap that formerly covered the entire country. Small glaciers are also to be found in the great northwest peninsula and in the northern highlands. Th. Thoroddsen has mapped the outlines of all the glaciers, but little has ever been attempted in the way of scientific exploration. It is true that a few ascents to portions of the glaciers have been made. Mr. W. L. Watts crossed a portion of Vatna Jökull in 1875, but nothing has been done to study these great table-land ice sheets, with their protruding volcanic peaks, to ascertain their real character. It is not known whether or not they are increasing, stationary or receding, or, if there be motion, what is the rate. The moraines are extensive and bare of vegetation in most places. Here is an attractive field for the enthusiastic explorer who is anxious to obtain scientific data.

These ice sheets are the main sources of the many rivers that radiate to all the fiords upon the coast. During the perpetual sun-

shine of the Arctic summer these rivers rise to torrential conditions and transport large quantities of glacial flour. Many of the streams run white with the silt and are extremely difficult to cross on ponies. The ice has a depressing effect upon the temperature in the valleys, for the Arctic winds blow across the glaciers and then sweep through the narrow valleys, especially in the north, maintaining a mean temperature during the summer months of about eleven degrees Centigrade. In the north, as we experienced in Vatnsdalr, it is not uncommon to have the sun obscured for two or three days with fog and squall and to see the haycocks sprinkled white with snow.



FIG. 1.—Map illustrating Mr. Russell's routes in Iceland.

Hot springs abound in nearly all the valleys and even on the slopes of the snow-clad mountains. Sometimes, as at Reykholt, they are in the middle of a cold river and spout boiling water up through the surface of the running stream. This same phenomenon occurs in some of the lakes, as in Laugarvatn and Mývatn. Geysers occur in several sections, but the chief group is at Haukadalr, where the greatest geyser in the world is located. This great gusher, *Geysir*, formerly had a period of eight hours. It is now intermittent. Its cone is regular, its tube straight with a diameter of nine

feet for a distance of eighty-four feet, where it disappears in subterranean ramifications. The basin is saucer-shaped, sloping inwards at an angle of about thirty degrees, with a diameter of seventy-two feet. The eruption presents a magnificent spectacle. The ground trembles for a few moments before the explosion, the surface of the water in the basin is violently agitated, sinks back to a state of quiescence, then, without further warning the superheated water is hurled into the air to a height of 100 to 125 feet. The column of water is held at this height for at least eight minutes and sometimes for ten. The sun is obscured by the dense volumes of steam, and a veritable river of boiling water rushes down the geyserite



FIG. 2—Midsummer in the Oxnadalr Pass. Typical farm house. Over the house is seen a glacial valley in which fragments of the former glacier still linger. Note the semi-circular shape, characteristic of all Icelandic glaciated mountains.

gorge. Scores of other geysers are in the plain, each with peculiar characteristics and of great interest. This place has been more carefully described in literature than any other spot in Iceland.

Along the axes of volcanic activity and especially at the volcanic foci of the island there are many solfataras in a lively condition. They emit great volumes of steam, sulphur dioxid and carbon dioxid. Those at Krisuvik, Krafla and Mývatn are the most extensive. Many thousand tons of sulphur have been sublimed at these localities, especially at Krisuvik, where one pile is estimated to contain over 200,000 tons of nearly pure sulphur. There are two great

foci of volcanic activity in the island, Hekla in the south and Krafla in the northeast. Fifty miles to the south of Krafla is Askja, which marks a strong volcanic center. It has been supposed that there is a subterranean connection between this great heated area and Hekla. This territory has not been carefully explored. The great crater of Askja was carefully examined by the late E. Delmar Morgan, F.R.G.S., and formed the subject of a paper read before his society in January, 1882. The writer has fully explored Hekla and Krafla and observed their conditions. They are far from inactive and may burst forth at any time with all the violence of the past. Hekla has been quiet longer than its average period and shows strong evidence of an eruption in the near future, unless the pres-

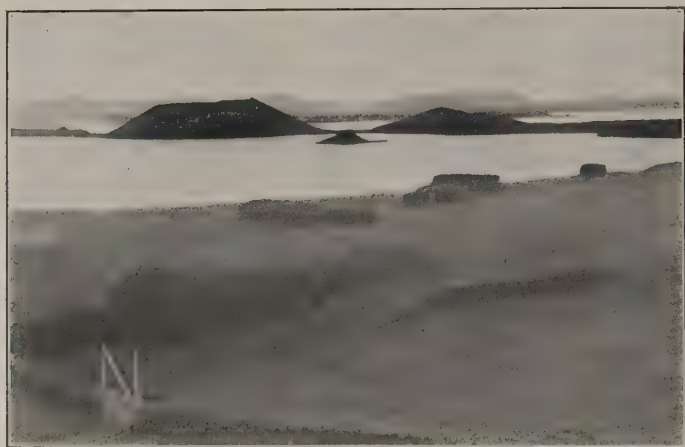


FIG. 3.—Mývatn, showing the crater islands with Krafla in the center, thirty miles distant.

sure is relieved through the many small vents along the line of activity between it and Krafla.

The mountains conform to no system. They are all of volcanic origin, very numerous, cone-shaped or weathered into bluffs and pinnacles, and are scattered with the greatest irregularity. Between the mountains there are numerous short and often crooked valleys of considerable fertility, especially in the lowlands or at the terminals of the more ancient glaciers, clothed with luxuriant and nutritious grass and freely sprinkled with a rich and varied Arctic flora. All the valleys have been deeply gouged by glaciers of quite recent geological date and show the work of the iceflow at its best. This is especially true of the Oxnadalr in the north, which is semicircular in cross-section and has not sufficiently weathered to loose the ice markings.

The uplands are wild moorlands or vast wastes of glacier-fractured lava in chaotic mounds and ridges which enclose numerous small sheets of water. A good illustration of the great and unfrequented interior is Grimstungaheithi, which extends from Haukagil southward along the edge of Láng Jökull to Kalmanstunga, a distance of about sixty miles. We ascended the bluff at Haukagil early in the morning and set out upon this great waste which reaches from the fertile valleys of the north to the glaciers of the great central plateau. For a while we found traces of an ancient trail and a few tumble-down cairns which soon disappeared. Hour after hour we plodded along, guided by the irregularities of the



FIG. 4—Grimstungaheithi, characteristic moraine, Láng Jökull twenty miles to the south.

ground and the glimmer of the glaciers that loomed higher and higher above the horizon.

This particular section which we were privileged to examine from horseback is a broad moraine, fresh from the receding glacier, chaotic, empty, vast and dreary. There is nothing to relieve the monotony of the scene save the increasing mass of glittering ice upon the horizon and the piping of the plover with the occasional trumpet of the swan with which the little lakes abound. The angular fragments of lava, somber gray, variously riven and confusedly hurled in piles, as though some vast mountain had been crushed like an eggshell and the fragments scattered by a titanic hand. No touch of verdure relieves the cold ruin and weary waste

save at the margins of the numerous glacial tarns which in the distance glimmer like sheets of light. Such is the great interior of Iceland, where man seldom penetrates; areas of lava succeed areas of life-destroying sands only to give place to other areas of glaciers or scorching solfataras.

As in the early days of colonization, so now, the people dwell in a narrow strip of land around the coast, where they have access to the life of the sea, cultivate the lowlands and drive their horses and flocks to the mountain glens for summer pasturage. The population is about 80,000, and outside of Reykjavik, with its population of about 11,000, and one or two towns of 1,000 to 4,000 people, the population is widely scattered.

With the slight exception of a little Pliocene on Skjalfandi Bay, the entire island is volcanic. There are one or two places where traces of lignite occur and these places contain a few fossils of Pliocene time. About 25 per cent. of the rock formation is ancient basalt and another 25 per cent. is composed of ashes, sand and alluvial accumulations. The remainder is about equally divided into post-glacial basalt, post-glacial liparite, pre- and post-glacial dolerite, granophyre, palognitic breccia, conglomerates and tufa. Many of the lavas are rich in beautiful crystals of zeolite. There are two veins of the famed Iceland spar. Copper, in the form of carbonate, is abundant, especially in the pass of the Oxnadalr and on the bluffs at Seythisfjord. The vast accumulations of sublimated sulphur would well repay the expenditure of a little capital and energy.

The Mývatn region is one of the most beautiful as well as one of the most awe-inspiring in the country. Mývatn, "Midge Lake," is twenty miles long, the second lake in size, and not over seven feet deep. Many low crater islands dot these waters and hundreds of them fringe the southern shore, giving to the surrounding country an exact representation of the mountains of the moon as viewed through a telescope. Hverfjall is one of the largest of the world's craters, rising from the eastern shore of the lake to an altitude of 700 feet, circular in form, it encloses a central mound of crumpled lava. It is four miles in circumference on the top of the rim. There is no evidence that lava ever flowed from this cone. It is an explosion-crater pure and simple. A force beyond the comprehension of man thrust upward this mighty mass of crust and dropped the fragments of the explosion in the mound above described. The smaller craters are of rare interest. Nowhere else are their peculiar formations duplicated. These hollow, circular cones have a uni-

form radius and rest upon a level plain with their bases confluent. Their slopes are covered with numberless bombs of the characteristic explosive type. One crater deserves special mention. From this orifice liquid lava was hurled straight into the air. The fiery globules were thrown upward to such a height that they solidified in the air and returned to the crater and around it like a shower of grape-shot. These bombs are round and vary in size from tiny pellicles to croquet balls.

In Vatnsdalr there are conical mounds of crumpled lava so numerous that they have never been counted. Hundreds of acres are covered with these cones. They range from ten to one hun-



FIG. 5.—Geyser in the center of a glacial stream near Reykholt. Note the boiling water at the left end of the geyserite.

dred or more feet in height. Lock and an Icelandic geologist, whose name I can not now locate, believe them to have been formed by upheavals of lava. Another authority in Sweden states that they are merely glacial moraine. After spending a full day in their examination I can not agree with either of these authorities. First, there is no trace of any glacial action on the fragments. Again, there are no evidences of any recent lava flow, either in sheets or intrusive plugs to be found. Lock gathered seventeen specimens of lava on one of them, and I found at least twelve distinct kinds of lava on a cone about ninety feet high. It is my opinion that deep-seated subterranean explosions took place with considerable frequency heav-

ing upward the crust into these crumpled cones and eventually finding vent elsewhere. This is in accord with the explanation given above relative to the formation of Hverfjall.

The form of crater known as "Tintron" in Iceland and elsewhere rare, if found at all, is a tall chimney rising from the level plain with a round hole extending into the bowels of the earth. The interior surface is hung with long, fantastic masses of lava that cooled in this position from the drippings when the liquid material was hurled into the air. There are several around Mývatn, some excellent ones near Húsavík and one not far from Thingvellir. With some difficulty they may be ascended. The view down into

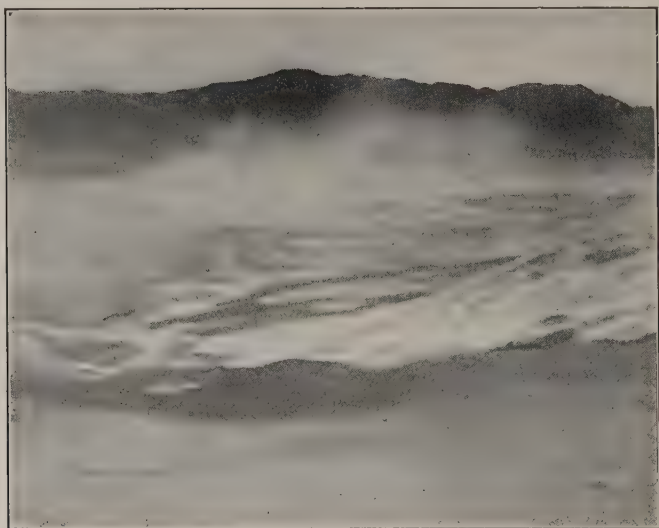


FIG. 6—General view of a portion of the solfatara near the base of Krafla.

the chimney where the lava hangs in shreds, blistered and twisted, is weird and gives to the imagination a vivid picture of the conditions in the days when molten rock shot out of these orifices and dripped sizzling and spluttering back into the nether furnace.

A trail from Mývatn leads over the smoking mountain of Námas-karth, where no trace of vegetation is found and where it is necessary to pick one's way with extreme caution among the steaming fumaroles and pools of boiling mud. As far as the eye can range, the mountain is covered with crystals of sulphur, alum and gypsum. The entire northeast slope is thinly crusted and perforated with violent and ill-smelling vents. Great areas of mineral earths rest upon a substratum of viscid, hot and sulphur-permeated clay. The

upper crust is composed of sublimated chemicals brought to the surface by superheated gases. The crystals vary in form and beauty with their chemical constituents. As one crunches them under foot he has the sensation of walking with hobnails through a jeweler's show-case. Here one stands at the protoplast of the earth's crust. There are many groups of boiling springs, mud cauldrons, varying from a few feet to thirty in diameter. They are filled with bolus of inky blackness, sulphids of the metals. The location of the cauldrons is not fixed. They often crust over, and new ones form where yesterday it was safe to walk. They boil, spatter, splutter and emit great volumes of steam and sulphur gases. Masses of the hot and



FIG. 7—"Balder's Bra," *Bellis perennis*, dense mass near the shore of a fiord.

sticky stuff are frequently ejected with violent and unexpected explosions.

The ascent of Krafla is made by a series of zigzag curves over ridges of hot clay, interspersed with ravines of boiling water and masses of volcanic ash. Near the summit there is a large ridge of obsidian in isolated pinnacles, ragged and of the deepest black. It is the purest natural glass. Several craters on the southern slope are filled with water, others are sufficiently hot to forbid a near approach and pour forth continuous volumes of gases with tumultuous sounds. This portion of the mountain is entirely void of vegetation save the algæ in the hot springs. Hidden pools of boiling bolus

vomit their horrid contents, and the many deep ravines, worn out of the ash and viscid clay, render exploration arduous and somewhat dangerous.

We decided to descend the unexplored shoulder of the mountain by a spiral route and became entangled in an intricate mesh of deep gullies, ridges of dry ashes and rivulets of boiling and foul-smelling water. Cautiously we proceeded with the laborious undertaking, leading the ponies, searching for a place to descend the slopes and then working much harder to get out, only finding it necessary to repeat the exploit many times. The trusting ponies followed our ignominious slides into the gullies and after much coaxing managed to scramble up after us in a very besmirched condition.

Our route led south across the western desert to the border of the glaciers, Láng Jökull, Eyriks Jökull, Geitland's Jökull and Ok Jökull, with many a stony ridge to climb and glacial torrent to ford. My purpose in this locality was to choose a place for a future ascent of Láng Jökull and to visit the great lava tunnels. South of Eyriks Jökull we came upon an extensive lava sheet, the Hallmundahraun, cracked, crumpled, twisted and tangled. Beneath this lava sheet which fills the broad valley is Surtshellir Cave, the greatest lava tunnel known. Two of these caverns, in form like trolley subways, parallel each other. One has been known for centuries and the other was discovered in 1909. We explored the former, which extends in a straight line for over a mile. It is arched with basaltic plinths and the walls are hung with lava stalactites and nets of lace-like lava in strange, fantastic form. The floor is littered with blocks of every conceivable shape, which time has hurled from the vaulted dome. In places the water has dripped through from the surface to form grand ice stalactites forty-five feet high. Over half the way to the far end of the cavern a wall of ice blocks the passage. By the aid of the strings of lava on the wall we climbed over and gained the slippery summit. Soon after we came to the end of the cave and found the cairn erected by Povelsen in 1753. Upon the capstone, with the wax from our candles, we fastened two Lincoln pennies bearing the date of 1910 as evidence to future invaders of the ancient realm of Sotur that two Americans had gained access to the remote corner of the wierdest lava chamber known. A side passage not far from the entrance contains numberless bones of sheep, horses and cattle. The place was occupied hundreds of years since by Icelandic outlaws, who lived by robbing the farmers to the south. There are no animals in Iceland large enough to carry these bones. The fact that Henderson mentions them in 1817 and Povel-

sen in 1753 leaves little doubt as to their great age and that they were deposited by the outlaws. I took from this cave the rib of a horse that had been fractured and then mended in the body of the animal. Examination of the surrounding lava sheet leaves no doubt that these lava tunnels were subterranean passages where the liquid lava flowed to a lower level long after it had cooled on the surface.

Several miles south of the cave the Hvitá, White River, plunges over the Barnafoss near Gilsbakki. Its channel is a great rift in the pre-glacial lava flow, which formed the lava tunnels above mentioned, spread over the entire valley and ceased to flow at the very



FIG. 8—Water flowing out of the lava into the canyon of the Hvitá. Note the superimposed lava above the half mile of falls.

brink of the Hvitá's canyon. The water from the glaciers disappears in the lava several miles above the falls. The Hvitá comes out of one valley and the sheet of lava out of another, and the condition to be described exists at the junction of the two valleys. The glacial river flows for miles under the lava and reappears at the brink of the canyon between the ancient and the recent lava flows. Half way up the bluff the water pours out in a series of waterfalls extending down the canyon for half a mile. In places the water spurts out with evidence of considerable pressure from behind, for it leaps in strong jets into the air to fall into the river below. At the point of contact between the lavas there is a mass of obsidian that was formed in ages past and again became heated and has been

metamorphosed and pulled and stretched into peculiar forms. To the writer, it is one of the finest views and places for dynamic study in Iceland.

The view from the brink of this canyon across to the ice mountains is one of great beauty. Looking up from the hayfields, the ice-crowned pyramids stand,

"Like giants clad in armor blue,
With helmets of a silver hue."

RICE IN THE UNITED STATES

BY

G. T. SURFACE, PH.D.

When European explorers found the new world in their search for an all-sea route to Southern Asia, they and their merchant countrymen conceived the idea of producing in these new lands the chief commodities of import from Africa, Asia and the East Indies. Sugar, tea, spices, indigo, silk, rice and cotton were in demand in Europe, but sugar figured most actively during the fourteenth and fifteenth centuries in industrial experimentation, as well as in trade manipulation. In the early decades of Virginia colonization attempts were made in cotton, silk and rice culture without success. In the Carolinas indigo and tea were added to the experimental list. The production of indigo flourished only temporarily, but cotton and rice maintained successfully a survival struggle, even after the introduction of tobacco from Virginia and sugar cane from Georgia.

Rice had so fully demonstrated its usefulness as a nutritious and easily transported food that persistent attempts were in progress to extend its cultivation in Spain, Italy and the Mediterranean islands; but, on account of the small amount of land adapted to crude methods of irrigation, increase of production had not kept pace with the increase in consumption. The first attempt at growing rice in the colonies was made in Virginia by Sir William Berkeley in 1647, but the inferior adaption of climate and the phenomenal field and market success of tobacco repressed the exploitation of rice, and it remained for South Carolina, a half century later (1694), to realize more encouraging results by planting white East India rice, accidentally obtained from a stranded Madagascar ship. Subsequently,

rice was grown in South Carolina, and about 1725 began to assume commercial importance, the export for that year being 9,212,000 pounds. The expansion of the industry was rapid from 1725 to 1740 (400 per cent.), but from 1740 to 1840 the increase was less than 100 per cent. The effect of the Civil War on the industry was so disastrous that the average production from 1840 to 1850 was greater than from 1850 to 1880.

The Cajuns (or Cajans), of Acadian ancestry, began the garden cultivation of "Providence" rice in Louisiana about the middle of the eighteenth century. They planted small plots and cultivated



FIG. 1.—Map of Rice Cultivation in the United States, 1910. Scale 1:17,000,000 (268.30 miles to an inch). Stippled areas represent rice districts.

them by the crudest methods, so that the first century of rice culture in America's greatest rice belt effected little more industrially than to demonstrate the adaptation of the soil and climate to produce the crop. Although New Orleans handled all of the surplus, there was only one rice mill in the city in 1840. Greater interest was, however, being manifested in rice as a money crop, the significance of which may be inferred by the construction of eight additional mills in New Orleans from 1840 to 1880. The Census of 1880 gave Louisiana a production of 23,000,000 pounds, as compared with Georgia's 25,000,000, and South Carolina's 52,000,000 pounds.

Only Carolina rice had thus far been planted in the State, but in 1881 native seed was imported from British Honduras which was so satisfactory as entirely to supplant the Carolina variety. Its introduction marked a new era in Louisiana rice growing, and in eight years the State rose from third to first rank. This was accomplished not only by the larger acreage yield and the better quality of the Honduras rice, but by the extension of cultivation into the prairie lands, where it was grown both by irrigation and rainfall ditch storage, the latter being commonly designated as the "Providence method." In 1884 Maurice Brien, of Jennings, La., harvested his



FIG. 2—Breaking ground for rice in Arkansas along the "Cotton Belt Route."

rice crop successfully with a Deering twine binding harvester, and this gave to the industry a new lease of life by reducing the cost of production at least 20 per cent.

During the decade 1890-1900 Texas discovered her marvelous possibilities for rice growing, and responded to that realization by increasing her cultivated area from 2,000 acres (1895) to 70,000 acres (1900). In 1910, 264,000 acres were under rice cultivation, the yield of which was 8,738,000 bushels. Jefferson, Orange, Liberty, Jasper and Chambers counties constitute the present intensive producing belt.

While Texas, in the nineties, was making her phenomenal strides

in rice growing, Arkansas gave no cause for expectation, the increase for the decade being from 9 to 25 acres. The rice interest in the State, however, began to show signs of life in 1902, when W. H. Fuller of Lonoke County obtained a large yield from a garden plot which was a representative soil of the Grand Prairie. By 1904 he had increased his rice field to 70 acres, from which he harvested an average of 74 bushels per acre. This returned a net profit of \$56 per acre, a sum sufficient to have purchased, three years previously, 1,000 acres of the most fertile land in the prairie. It is now no surprise that the area in rice increased from 460 acres in 1905 to 40,000 acres in 1910, and that the price of land especially adapted to rice jumped from \$10 to \$100 per acre.



FIG. 3—Rice field at Waldenburg, Ark.

It is impossible to contemplate the progress of our domestic rice industry during the decade 1900-1910 without being impressed with its industrial and economic possibilities. It demands a new place in statistics and a new interpretation as to its national utility. In this short period rice growing has been raised from amphibious cultivation by hand to the attractive position of sanitary and scientific agriculture under machine cultivation. The cultivated area increased from 351,000 to 720,000 acres (105 per cent.), and production increased from 250,000,000 to 677,000,000 pounds (270 per cent.). The expansion of the industry is clearly indicated by the acreage figures, but more significant are the production figures, which reflect

the progress in method. The total production from 1900 to 1910 exceeded that of 1850-1900, which must suggest even to those of doubtful mind a new era of American rice.

If we were to think of the domestic industry as a sort of side issue for supplying cheap food to the laborers of the swamp sections the review of the above figures would suggest a decline, if not an elimination, of rice imports. Instead of declining, however, they increased from 102,900,000 pounds to 225,000,000 pounds, an increase of 118 per cent., which exceeds the acreage increase during this period of unprecedented expansion. The domestic industry is protected by a duty of 2 cents per pound on clean rice. This enables the Southern rice growers to compete on a profitable basis with the cheap labor countries, British India, China and Japan.

According to the recent Census the population of the United States increased 21 per cent. during the last decade. In 1900 our per capita rice consumption was 4.1 pounds, but in 1910 it was 8.1 pounds. The history of this country gives no parallel example of so rapid an increase in the use of a staple food. We cannot accept it as the natural reflex of an enlarged production forced upon a somewhat indifferent purchasing public, for this increased domestic production was so inadequate to meet the demand, that the annual imports had to be more than doubled. A multiplicity of causes have conspired to bring the cereal into greater popular favor. Modern irrigation and the adaptation of agricultural machinery gave impetus to a more economic production. The manufacture of rice into palatable and nutritious breakfast foods constituted an entering wedge for a larger and more general consumption in the north and west, where it had been used to a very limited extent by native whites. The increase in the price of our staple foods which, according to the Government estimate, rose 36 per cent. from 1896 to 1910, made the consumers more receptive to experiments on cheaper foods. Probably more influential than any of these was the publicity given the commodity by the Rice Associations, the railroads, the milling corporations, the wholesale representatives, and the State Departments of Agriculture. Illustrative of this may be mentioned the unique experiment in 1909 of naming Sept. 30, as "Rice Day," in observance of which every railroad in the United States was requested to serve rice in varied and attractive preparations in all the dining cars and eating stations. The invitation was especially extended to hundreds of hotels, and through the newspapers every householder in the land was invited to participate.

Since rice is the chief food of more than half of the world's

population, and has maintained that position through thousands of years, it would seem to be convincing evidence of its efficiency as a food. Many Americans, however, are prejudiced against it as a food, and think of it as a cheap boarding-house dish to be used as a last resort, but very useful in tiding over Asiatic famines. Those who have been served by the famous Creole cooks of Louisiana will readily admit that the variety and excellence of the prepared forms of rice give it high rank among cereals as human food.

Pathology and dietetics report in favor of rice because it is more readily and easily digested than other cereals and staple foods, being assimilated in an hour, as compared with four hours for brown



FIG. 4.—Harvesting Rice, Sunset Route.

bread, two and one-half hours for potatoes, two hours for lamb, and four hours for pork. Chemistry reports in its favor because it contains all the essential nutrients, being rich in carbohydrates, the fuel or energy producing nutrient, and abundant in proteid, the muscle building nutrient. Comparison with all our staple foods shows that for a balanced nutrition from equivalent weights rice is only excelled by oatmeal, peas and cheese; but on the basis of the cost of nutrients, it easily outranks these.

A food that digests so easily and completely as to be adapted to invalids, and that sustains so vigorously and powerfully as to meet the demands of the day laborer and the soldier, must possess merit

which will give it a conspicuous place in the diet of any country adapted to its production.

The economy of the food is a feature of special interest. Served with fruits and meat, fruits and butter, sugar and butter, sugar and cream, or fruits and cheese, it constitutes a balanced ration. In China and Japan, where meat and meat products are scarce, the balance is effected by the use of beans and peas, both of which contain fats and proteids, the important nutrients of meats, butter and milk. Supposing that the *menu* is to consist of six parts, rice can supply three of them in palatable nutritious form without repeating any one in the same week. To make these three rice preparations proportionate in bulk and nutrition to the other-than-rice foods will require one pound to five persons for bountiful service. This one pound at the



FIG. 5—Rice field_farm of S. H. Taggart, Stuttgart, Ark.

retail price of first grade domestic will cost 10 cents, which is about double the wholesale price. A fair grade containing some cracked rice costs 5 to 6 cents per pound, and possesses the same nutrition qualities as the "goods" or "primes." After making due allowance for a liberal use of accessories in the cooking, rice remains by a wide margin the cheapest food on the American market, the significance of which is more accurately appreciated when we recall that more than half of our native population spend half of their total income in the purchase of foods.

The necessity of utilizing by-products becomes more apparent and urgent with the growth of any industry. All the by-products of rice are adaptable to fields in which the Southern States are purchasers, rather than producers of a surplus. From one-fifth to one-

sixth of the total crop is low grade, and must either be sacrificed on the market or consumed at home. If ground and fed in a mixed ration it has about the same feeding value as corn meal, which is imported into the Gulf and Atlantic States in large quantities. Rice, molasses and cotton seed meal contain the nutrients for a well balanced ration. The same is true of rice and alfalfa, or rice and soja (soy) beans, and all of these are successfully grown in the South.

It is not yet determined how extensively rice will be used in the manufacture of flour, but the results are proving highly satisfactory, and each year brings a steady increase in the amount that is mixed with wheat flour, corn meal, oatmeal or buckwheat flour. Cracked



FIG. 6—Sacking Rice in Field.

rice, if clean and sound, may be profitably marketed in this form, and the lower grades consumed as a stock food.

The Japanese and Chinese manufacture starch and pastes from the less marketable grades and then make rice sugar of the factory by-product. Since considerable quantities of this rice sugar (*ame*) are imported by our Mongolian immigrants there is the possibility of supplying the demand with profit from the American rice fields and factories.

Thousands of tons of rice straw are now burned to clean the land for the next crop. This straw possesses more potential value per acre than is realized from the average acre of wheat in the United States. The rice fields average two to three tons of straw per acre, which is valuable both for stock feeding and the manufacture of

paper pulp. The larger return can be realized by converting it into pulp, since two and one-fourth tons of straw yield one ton of pulp, which sells readily at \$40 to \$60 per ton. The cost of the pulp manufacture is about \$20 per ton, leaving a large margin of profit to be divided between the rice grower and the pulp or paper manufacturer.

The expansion of the rice industry is a special benefaction to the agricultural interests of the cotton growing States. Not only will it



FIG. 7.—Interior of Rice Mill at Stuttgart, Ark.

make practicable the drainage and reclamation of more than 20,000,000 acres of marsh and swamp lands, which are now a menace to health and industry, but it affords a profitable rotation crop with cotton on millions of acres of prairie and upland favorably situated for irrigation. The boll weevil is hastening its destructive march eastward over the cotton belt, and has proved most formidable and destructive in the Mississippi delta and the other alluvial lands of the coast. The most serious barrier to combating this enemy is the persistence with which it hibernates and survives in the Spanish moss

of the swamps. It seems, therefore, probable that an increased rice production will make possible a larger cotton production in the rice belt, and cotton is the overshadowing agricultural asset of the South.

In the vigorous exploitation of any money crop the temptation is to rob the land by the one crop system. Virginia has, for many years, been exhausting the soils of her tobacco belt. The farmers of the upland cotton belt could clothe every man, woman and child in the respective states with the eliminated cotton production which has resulted from continuous cropping in cotton. The great corn belt states presumed on the fertility of their lands until the diminished acreage yield stimulated a crusade for soil restoration and soil maintenance. Will the rice growers follow heedlessly, or profit by these examples?

Bushel for bushel, rice is not so exhaustive of soil fertility as the other American grains, but exceeds them on the acreage basis because of the larger yield. Rice averaged 33 bushels per acre in 1909, as compared with 15 for wheat and 16 for rye. An acre of rice producing 33 bushels removes from the soil 16 pounds of phosphoric acid, 42 pounds of potash and about 60 pounds of nitrogen. To replace this by the purchase of commercial fertilizers would cost \$15 to \$18 per acre, which is a prohibitive tax on the industry at present prices. The potash is largely returned to the land if the straw is not removed, and the nitrogen must be maintained by stock feeding and by rotating with legumes—such as cowpeas, beans, vetches, peanuts and clovers—which have the power of gathering nitrogen from the air.

Rice soils will rapidly deteriorate under any system of rotation unless adequate drainage is maintained, and there is no reclamation so expensive as that of acid and alkali soils. Under inferior cultivation, the one crop system, or inadequate drainage, red rice springs up and flourishes. This, even in small quantities, makes the crop unsalable.

We have reason to expect the rice industry to develop and progress on a more systematic, judicious and profitable basis than has been demonstrated in any of our staple crops, since irrigation projects and culture in both the arid and humid states are under the skilful supervision of engineering and agricultural experts. The United States Department of Agriculture is coöperating with the rice producing states in the study of the present and possible field, and has established a Rice Experiment Station at Crowley, La., for the instruction and protection of every grower of rice.

THE PEOPLING OF YAP

BY

WILLIAM CHURCHILL

YAP, official name of the German colonial administration Jap, vernacular Uāp (signifying land), sometimes spelled Wap on the charts, recorded by Dumont d'Urville as Goulou and Gouap with the note that *go* is probably an article. Latitude, Dumont d'Urville (south point $9^{\circ} 25' N.$; Meinecke, $9^{\circ} 35'$; Christian, $9^{\circ} 28'$ (the amusing compositor who set this $90^{\circ} 28'$ inadvertently lifted Yap off the earth by 28 miles); Furness, $9^{\circ} 28' 3''$ (entrance rock, Tomil Harbor); longitude, Christian, $144^{\circ} 17' E.$; Meinecke, $138^{\circ} 8'$ (Berlin); Dumont d'Urville, $135^{\circ} 41'$ (Paris); Furness, $138^{\circ} 4' 46''$. Length: (land surface) 12 miles (N.E.-S.W.), greatest width $5\frac{1}{2}$ miles (E.-W.); perimeter of wall reef 35 miles, width of reef 5 miles; area, of land surface 207 square kilometres, included within the reef 430 square kilometres; highest elevation ca. 300 metres. Population: Christian (1895) 8,000; Furness (1903) 5,000. Seat of administration: the islands of Tapalau and Blelatsch on the west side of Tomil Harbor. Discovery: first record made by Villalobos, January, 1543; but, because some of the newly found islanders greeted the Spaniards with the sign of the cross, a suspicion persists that the island had been visited by Alvaro de Saavedra in the prosecution of his voyage after leaving Uluthi (100 miles E.N.E.), which he discovered on New Year's day, 1528. Meinecke credits the discovery to the Dutch Admiral Schapenham in 1625, but as he continues his note by recording that Lazeano in 1686 gave it the name Carolina, from which the archipelago derives its name of the Caroline Islands, it is clear that this ascription is in error. Yap lay under nominal, yet wholly dormant, discovery title of Spain until 1885, when the cruiser Iltis hoisted the German flag at Tomil and declared the annexation of the island to the empire, the great Firma Godeffroy at Hamburg (later this firm became Die deutsche Handels- und Plantagen-Gesellschaft der Südsee Inseln zu Hamburg) having established a factory there in 1869; after prolonged negotiation Yap passed peacefully into German ownership in 1899 by purchase of the whole archipelago. Missionary effort: although within the apportioned sphere of the Micronesian mission of the A. B. C. F. M. of Boston, no attempt at the evangelization of Yap was made until 1856, when a brief Spanish effort was made; this was more energetically resumed under letters of Pope Leo XIII, May 15, 1886, which assigned the cure of these remote souls, suddenly become of interest to Germany, to the Spanish Capuchins; in 1902 priests of the same rule, but of the German province, relieved their Spanish brethren of the labor; at present there are eight stations of this mission on the island.

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- Salesius, Pater. Die Karolinen-Insel Jap; Ein Beitrag zur Kenntniss von Land und Leuten in unseren deutschen Südsee Kolonien. *Berlin: Wilhelm Süsserott, n. d., pp. 173, 38 illustrations, 1 map.*

In disentangling the intricacies of the human geography of the South Sea, the movement of its population toward the settlement which in the broader aspect had been permanent for a millennium before the European discovery of the island realms, a point has now been reached where the closest study must be given to Micronesia.

This designation of one of the three grand divisions of the South Sea was proposed by Domeny de Rienzi to the Société de Géographie of Paris Dec. 16, 1831. As used by this author the term was restricted to certain minute islands and barren rocks bounded on the south by the Tropic of Cancer and on the north by the parallel of 40°, on the west by the Borodino Islands, which Rienzi does not further identify in his encyclopedic work "Océanie," and which Stieler has not identified, and at its eastern extension including Necker Island. Within a month, namely, Jan. 5, 1832, Captain Dumont d'Urville proposed the extension of this division to include the Carolines, the Marshalls and other archipelagoes now popularly designated the Line Islands. This equatorial area had been included by Rienzi in Polynesia, for which he sought, earnestly but ineffectually, to establish a new name, Pléthonésie Tabouée. In our modern geography we have accepted Dumont d'Urville's application of Rienzi's name and have cast out from the area, as unpeopled and uninteresting, those islets upon which the designation was erected.

Micronesia has, up to the present, received the least study of all the grand divisions of the South Sea. For a long period the only source of information was the remote record of the great voyages of

discovery, mere reconnaissances at best and calling for the exercise of the greatest caution in the use of their hastily gathered and imperfectly assimilated material. Rarely was this record supplemented by the narratives of whalers and guano seekers; when accurate these were as arid as the daily log of the ship's work, when interesting as inaccurate as the picturesque mendacity of a Morrell could make them. Then came a brief but glorious period when that great ornament of Hamburg, free city of merchant princes, the Museum Godeffroy, gave promise of opening to the world the treasures of the islands at the Line. Unfortunately the Firma Godeffroy went down in disaster, and the flicker of light on Micronesia expired. In the modern epoch we are obtaining very slowly a few monographs upon these islands, a few vocabularies of their at present uncorrelated languages.

The immediately particular importance of a better knowledge of Micronesia lies in the fact that recent studies in the population movement of Polynesia and Melanesia have cleared the way so that at last we know that for which we are first to look in the sieve of low islands reaching far eastward athwart the course of any migration which came into southern and central Polynesia from the north. Of the basic peopling of Melanesia we have no hesitation in saying that we know absolutely nothing. Between New Guinea and New Caledonia we find several dissociate ethnic stems whose past history is hidden in such obscurity that it does no violence to our present information if we designate them autochthons.

In Polynesia the case is far other. It has long been surmised that two waves of migration, separated by a lapse of oblivious centuries, brought to the high volcanic islands of the South Pacific a population in ethnic unity but representing divergent planes of social development. To the former of these Polynesian migrations we may now, with great probability of accuracy, assign a date little removed either way from the beginning of the Christian era. In a long series of minute and intricate examinations of the linguistic data I have been able to prove* and to prick out upon the charts the course of this earlier migration. It was in two swarms. The separation began in Indonesia when the people were fleeing before the Malayan advance; it was still more widened by the almost continental mass of New Guinea; not until the arrival of each swarm in the Nuclear Polynesia of Samoa, Tonga and Fiji did the wandering brethren come together. One of the branches left Indonesia by way of Borneo, Celebes, Gilolo, and has left in Melanesia the record of its voyage by the north coast

* "The Polynesian Wanderings."

of New Guinea, through St. George's Channel in the midst of the Bismarck Archipelago, down the chain of the Solomons, thence to Deni (Santa Cruz), probably to Rotumā and eventually to an abiding place in Samoa. The other branch left Indonesia along the islands of its southern chain, passed through the Arafura Sea, coasted the southern shore of New Guinea through Torres Strait, thence from the Louisiades stretched across the open sea to new land in the New Hebrides and thus were led to Fiji and Tonga. To these courses I have given the names of the Samoa and Viti Stream respectively; to this earlier migration in general I have given the name of the Proto-Samoan Swarm.

It is not only that I have been able to establish in Melanesia the traverse of these two streams of Proto-Samoan migration. Amply confirmatory in these particulars the evidence is equally exclusive in regard of the later migration, that to which for reasons that will prove satisfactory to Polynesian students I have assigned the particular designation of the Tongafiti Swarm. That evidence which has established so conclusively the tracks of Proto-Samoan migration proves with equal force that the Tongafiti migration did not follow the Melanesian chain out of Indonesia or touch any part thereof.

Yet we know that after the lapse of so many centuries as might let the Proto-Samoan peoples lose all memory of their long voyaging and believe themselves the only men upon a world created for themselves alone, the Tongafiti appeared in Nuclear Polynesia and oppressed their brethren whom they found already there, a fiercer tribe, equipped with new gods and ruling by the might of the rigid tabu. In time they were expelled from Nuclear Polynesia, somewhere about the eleventh century of our era we may believe, and swept onward to establish new homes in oriental Polynesia as far north as Hawaii, as far east as Rapanui, as far south as New Zealand—in other words at the utmost limit of land in every direction of voyaging. It is easily established that the Tongafiti as well as the Proto-Samoans had had an earlier home in the archipelagoes now under the sway of Malayan races, later migrants and an expulsive force. I have shown that the later migrants did not make their voyage of settlement along the Melanesian chain. A voyage from the east violates the most consistent record of tradition, which with these races has the validity of history from which it falls short only in the time record. A voyage from the south is equally in violation of tradition and in other regards is geographically impossible. The exclusion is rigid, the north alone remains.

It is for this reason that our interest must be keen in any work which may afford us new and trustworthy information upon any of the islands of Micronesia. If we are in the future to make any identification of the Tongafiti voyage into Nuclear Polynesia it is in the meshes of the Micronesian sieve that we must look to find a grain or so held in lodgment that may interpret for us what grist has passed through. Therefore we turn with lively anticipation to "The Island of Stone Money" by Dr. William Henry Furness 3d, the newest word as to Yap of the western Carolines.

Evidently, this eager traveler has not familiarized himself with the scanty literature of this little known island. Not on this account does his narrative suffer, his record is that of an independent witness, seeing the life of the island for the few weeks of his sojourn from his own angle and therefore strongly corroborative of the painful and detailed accuracy of Father Salesius where the two deal with the same topics, and in general by the graces of his style and the avidity of his examination adding a lively interest to the facts which he presents. Whoever shall regard this as a pleasant record of travel with no slightest pretence to scientific geography will find the book agreeable in the reading, essentially accurate in its presentation of fact, an interesting record of an obscure people whose future lies in the balance of a higher civilization with which they can only with grave difficulty assimilate themselves.

Unpretentious in its scope, this book yet contains, although in an appendix, that which will serve to make its possession necessary to every student of the folk movement of the Pacific. This is an English version of an unnamed Capuchin priest's grammar and vocabulary of the language. The original, of a date little more than a score of years old, is out of print and practically unattainable. Dr. Furness has rendered science an inestimable benefit in recognizing the value of a stray copy which reached his hands and by incorporating it in his volume and thereby putting it within the reach of students. The grammar is practically worthless, based upon a false conception of the nature of the speech; this stricture is not specific, it applies to every attempt so far printed as a grammar of any language of the Pacific. But the vocabulary affords at once the opportunity to conduct an examination in search of the unknown course of the Tongafiti Polynesians if haply they passed through the Carolines at this their western extremity.

Thus are we equipped with a list of some 800 vocables of the speech of Yap. To those uncognizant of the obscurer languages of the Pacific the objection may, probably will, suggest itself that 800

words must be but a small fragment of the language. This natural objection is met in two ways. The first is that the speech is essentially exiguous; from my familiarity with similar languages in the same region I should not hesitate at all to regard a list of 2,500 words as practically an unabridged dictionary of the speech; by this estimate we find ourselves in possession of about one-third of the language. The second is that in the meagerness of the physical nature of such an island as Yap there is no great number of items to be named, and the intelligence of the islanders has not reached a degree of naming activity which should tend toward the expansion of the vocabulary; accordingly, the first essay toward the compilation of a word list would include in large proportion the names of the most common objects and of the most frequent acts. For these and for other reasons arising from familiar acquaintance with the races of the Pacific I regard this vocabulary as satisfactorily representative.

A careful search through these 800 words of Yap discloses thirty-six vocables which are of the Polynesian family. Before proceeding to a discussion of their condition it will be convenient to present them in a table. In successive columns are set down the form used in Yap, the form most characteristic of Proto-Samoan speech, the sense in English, and in a final column a note of the wider occurrence of the vocable. The notation in this column is simple: P indicates that the word is found in the earlier or Proto-Samoan migration, T denotes its occurrence in the later Tongafiti migration, M denotes its identification as a loan word retained in Melanesia, I that it is identifiable in Indonesia, and the numeral is a reference to the ample philologic record displayed under that number in the "Polynesian Wanderings." The table is followed by a series of notes presenting the scanty identifications in other languages of Micronesia.

YAP.		SAMOA.	MEANING.	OCCURRENCE.
<i>ran</i>	(1)	<i>lanu</i>	fresh water	PMI 334
<i>thuth, athuth</i>	(2)	<i>sūsū</i>	the breast	PMI 344
<i>tal</i>	(3)	<i>tali</i>	cord	PMI 348
<i>ful</i>		<i>folo</i>	to swallow	PT
<i>sesei</i>		<i>sae</i>	to tear	PT
<i>kamot</i>	(4)	<i>(k)umara</i>	Yap: taro Polyn.: sweet potato	PT
<i>likai</i>	(5)	<i>li(k)a</i>	a dream	PTI
<i>lu</i>		<i>lo-i-mata</i>	a tear	PTI
<i>malau</i>		<i>malau</i>	right hand	PTI
<i>lai</i>	(6)	<i>la</i>	a sail	PTI
<i>derra</i>	(7)	<i>fai-titili</i>	thunder	PTI
<i>koi</i>		<i>(k)ai</i>	to eat	PTM 46

YAP.		SAMOA.	MEANING.	OCCURRENCE.
<i>rengreng</i>	(8)	<i>lenga</i>	yellow	PTM
<i>ul</i>	(9)	<i>fulu</i>	feather	PTM 212
<i>tugui</i>	(10)	<i>tu(k)i</i>	to hit	PTM 211
<i>purpur</i>		<i>pulou</i>	a hat	PTM 103
<i>ayan</i>	(11)	<i>one</i>	sand	PTM 187
<i>tololobei</i>	(12)	<i>pepe</i>	butterfly	PTMI 190
<i>tham</i>		<i>(h)ama</i>	outrigger	PTMI 340
<i>tamadak</i>	(13)	<i>mata(k)u</i>	fear	PTMI 258
<i>tali</i>	(14)	<i>talanga</i>	the ear	PTMI 350
<i>rungak</i>	(15)	<i>longo</i>	to hear	PTMI 336
<i>ran</i>	(16)	<i>langi</i>	Yap: daylight	
			Polyn.: sky	PTMI 308
<i>pul</i>	(17)	<i>pupula</i>	Yap: moon	
			Polyn.: to shine	PTMI 284
<i>pin</i>	(18)	<i>fafine</i>	woman	PTMI 290
<i>num</i>		<i>inu(m)</i>	to drink	PTMI 321
<i>nu</i>	(19)	<i>u(h)a</i>	rain	PTMI 278
<i>niu</i>	(20)	<i>niu</i>	coconut	PTMI 330
<i>nik</i>	(21)	<i>i(k)a</i>	fish	PTMI 300
<i>lumots</i>	(22)	<i>lolo(m)</i>	to drown	PTMI 314
<i>la-ni-mit</i>	(23)	<i>mata</i>	the eye, face	PTMI 324
<i>kad</i>		<i>(k)ati</i>	to bite	PTMI 302
<i>dal</i>		<i>talo</i>	the taro	PTMI 349
<i>nifi</i>	(24)	<i>afi</i>	fire	PTMI
<i>tuf</i>	(25)	<i>fetū</i>	star	PTMI
<i>adaï</i>	(26)	<i>ia(h)i</i>	sea	PTMI 352

1. Marshalls: *dren*, water; compare Viti *ndranu*. Gilberts: *ran*, fresh water.
2. Chamorro: *sūsū*, breast of women.
3. Chamorro: *tālī*, cord.
4. Chamorro: *kamūle*, sweet potato. Tagalog: *kamote*, id. Aztec: *kamotl*, id.
5. Gilberts: *ririka*, wakeful.
6. Chamorro: *lāja*, a sail. Gilberts: *ra*, one width of a mat sail.
7. Mille: *dāru*, thunder; *darrum*, lightning.
8. Gilberts: *renga*, red cloth.
9. Chamorro: *pūlo*, hair. Gilberts: *buruburu*, fringe, fur.
10. Gilberts: *toki*, a chisel.
11. Chamorro: *ūnai*, sand.
12. Chamorro: *abābang*, butterfly. Marshalls: *babbub*, id.
13. Marshalls: *mijak*, fear.
14. Chamorro: *talānga*, ear. Marshalls: *lōjilingō*, id.
15. Chamorro: *hūngu*, to hear. Marshalls: *rōng*, id.
16. Marshalls: *rān*, day. Mille: *lung*, sky. Chamorro: *langit*, id.
17. Chamorro: *pulan*, moon.
18. Gilberts: *aine*, woman.
19. Chamorro: *ātchan*, rain. Mille: *ut*, id.
20. The word in Yap denotes a coconut grove but not the nut itself. Chamorro: *nījo*, ripe coconut. Marshalls: *nī*, coconut tree and young nut. Gilberts: *nī*, coconut tree.

21. Chamorro: *guhan*, fish. Marshalls: *iek*, id. Gilberts: *ika*, id.
22. Chamorro: *lūmos*, to duck, to drown.
23. Chamorro: *māṭā*, eye. Marshalls: *mej*, eye, face. Gilberts: *mata*, id.
24. Chamorro: *gudfe*, fire. Gilberts: *ai*, id.
25. This identification rests upon metathesis, the only occurrence of that mutation in this material, but abundantly active in Polynesia and Melanesia.
26. Chamorro: *tāse*, sea. Tobi: *tat*, id. Tarawa: *taari*, id. Mille: *lajet*, id. Gilberts: *tāri*, sea, salt water.

Without engaging too deeply in the philological consideration of this record we find ourselves in a position to deduce a few conclusions which bear pertinently upon the peopling of Yap immediately and in wider extension upon the folk movement of the Pacific.

1. In this vocabulary of 800 words not quite a half of one per centum manifests a Polynesian content. All but eight of these Polynesian words lie within that list of about 150 vocables which has formed the wholly insufficient basis for the erection of a Malayo-Polynesian speech family.

2. Not one of these words is a specific possession of the later Tongafiti migration, a mark differentiating it from the Proto-Samoan migration. We therefrom deduce that the Tongafiti fleet in its passage from some Indonesian exit toward its first definitely established landfall in Samoa has left no trace in Yap of the western Carolines. Under the well-comprehended conditions of such ethnic voyaging the absence of trace is fairly to be regarded as proof that Yap lay wholly out of the course. So far, then, as concerns the Tongafiti squadrons the evidence of Yap is exclusive.

3. Whence, then, came this Proto-Samoan content to Yap? I cannot see that it was reached by a direct voyage. In the first place I have established too firmly the two great streams of that migration in a remote tract of ocean. Of course it is possible that an errant squadron of canoes may have forsaken the general flight, but I feel sure that my note on Malayan resemblances will set this possibility aside. The comparison of the Yap forms with the standard Polynesian will show that all but three of these words have undergone greater or less deformation either on or before reaching Yap speech organs. I shall not tarry to analyze the phonetics of these words. There are a few noteworthy forms which show that the alteration was accomplished while the words were in Indonesian possession and after leaving their Polynesian owners. In *rungak*—*longo* the formative *k*-final is an Indonesian mark; the vowel change is found partly in the Javanese homonym *rungu*, partly in the Malay *langan*. A second Indonesian mark of mutilating differentiation is the *n*-pre-

fix. Of this we find in this list three instances. These are *nu—ua*, *nik—ika* and *nifi—afi*. The second of these is paralleled in Indonesia by *nyan* of Tidore. The examination of the particular languages of Indonesia which are more nearly in resemblance with the Yap forms of these critical words serves to indicate the source whence the material derives. In general they are found in parts of the Malay Archipelago within the range of the northern equatorial counter-current, that is to say in regions from which the Celebes Sea and the Straits of Molucca would serve as the most convenient exit eastward. It may be that the *prahus* were pushed along this fairway by the adventurous spirit of their crews, it may be that their sailors came haggard to this land in the waste of waters. However that may be, it is quite clear from this record that Yap received its Polynesian content only at second hand, that the race which has introduced this slight contamination is the Malayan and that its epoch was subsequent to the expulsion of the Polynesians from Indonesia. Reduced to our chronologic scale, this must have been later than the beginning of the Christian era.

Dr. Furness has put it within our power to dissect out a few facts about the peopling of Yap. The relationships of the principal mass of the population after this Malayan admixture has been factored out remain for closer study of the people of Yap and for a richer supply of Micronesian data upon which comparisons may be based.

GEOGRAPHICAL RECORD

THE SOCIETY'S EDUCATIONAL EXHIBITION

The collection of European maps, atlases and text-books made by the American Geographical Society late in 1908, was exhibited at the State Normal School, Worcester, Mass., from May 11th to May 30th last. This account of the exhibition has been sent to the *Bulletin*:

"Notice was sent to all schools in neighboring towns, and teachers from many places in Worcester County visited the exhibition. A number of classes in charge of teachers from the city schools also improved the opportunity. The text-books and atlases were displayed in one room and carefully arranged so that the visitor might see their value and be attracted to examine them. Special explanations of the best features of these books were given to groups of visitors. The atlases especially attracted attention for their fine workmanship. The maps were displayed by countries: those of Austria in one room, of England in another, of Belgium in another, and the German maps in the long corridor of the school. Most of these were hung level with the eye, so that they might be closely in-

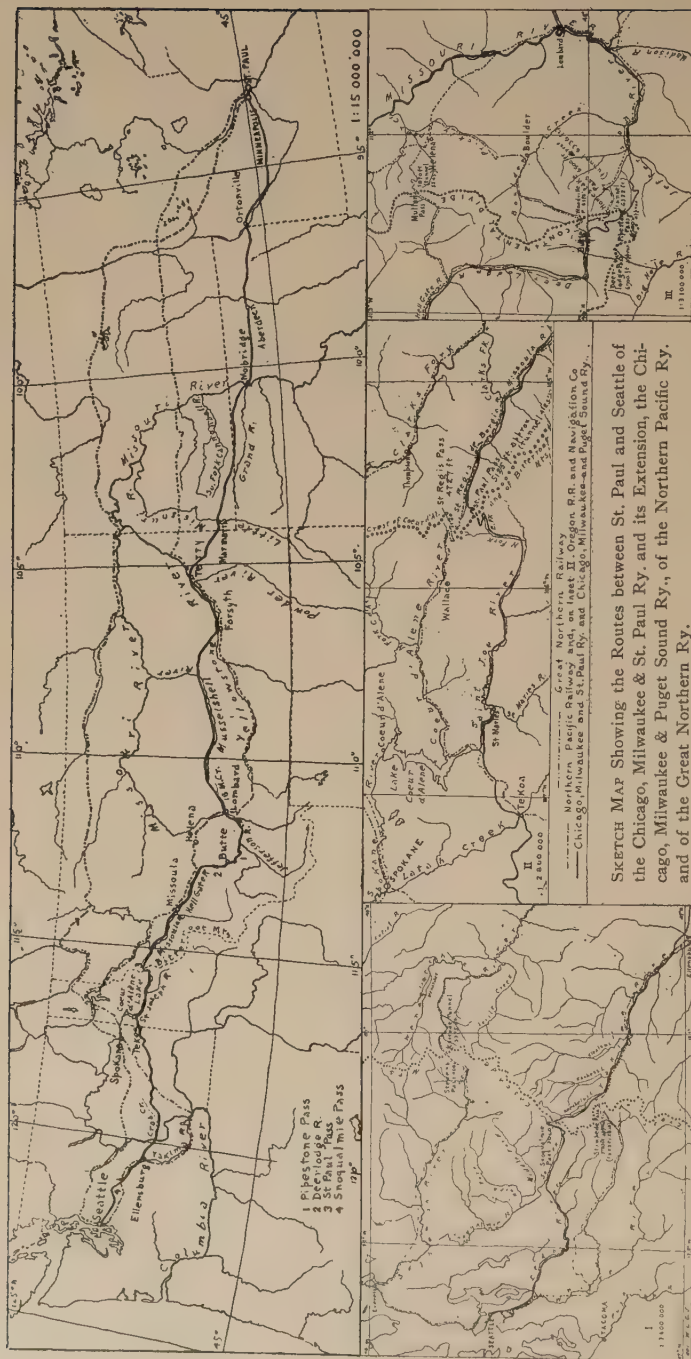
spected. A typewritten description was attached to each map, and as far as possible the exhibition was made self-explanatory. The special points of value of each map were noted.

"In class-room work a discussion of what a school-room wall map ought to represent was undertaken, and this was followed by an inspection of the maps, to note which exhibit most nearly met the ideal. The exhibition was successful in its educational influence, which will tend to promote improvement in geography work in this neighborhood. The Worcester State Normal School congratulates the American Geographical Society upon what it is doing in the interest of geography instruction."

NORTH AMERICA

NEW TRANSCONTINENTAL RAILROAD. (See map p. 520.) On May 28th through passenger service began on the Chicago, Milwaukee and St. Paul Railway between Chicago and Seattle. This marks the opening to through traffic of a new transcontinental road.

From Chicago to the Missouri River the line follows the route of the Chicago, Milwaukee and St. Paul Railway, previously in existence, via Milwaukee and St. Paul, thence due W. via Ortonville, Minn., and Aberdeen, S. D., to Mobridge on the Missouri R., at the mouth of the Grand R. From here to Seattle the route is over the new Chicago, Milwaukee and Puget Sound Railway. After crossing the Missouri R. at Mobridge, the line continues to the W. N. W., between the Grand R. and the South Fork of the Cannon Ball R., crosses the Little Missouri R. at Marmarth and reaches the Yellowstone near Terry, Mont., near the mouth of the Powder R. The Yellowstone valley is then ascended to Forsyth ($106\frac{2}{3}^{\circ}$ W.), the line paralleling the Northern Pacific Railway for this distance. From here the line crosses over to the Musselshell R. at its bend from an easterly to a northerly course, ascends to its head, crosses over to the valley of Sixteen Mile Creek and descends it to the Missouri R., which it reaches at Lombard. From here to the head of the St. Regis de Borgia R., for practically the whole of this distance of about 300 miles, the C., M. and P. S. Ry. in its course up the lower Jefferson R., through Butte and down the Deer Lodge, Hell Gate and Missoula Rivers, parallels the main line of the Northern Pacific Ry. or one of its branches, usually following the opposite bank of the watercourses used by its rival. The only deviation from the Northern Pacific's line is at the Continental Divide, which the C., M. and P. S. Ry. crosses by means of two tunnels under Pipestone Pass at an elevation of 6,322 feet, only five miles south of Homestake Pass, followed by the Butte Branch of the Northern Pacific. (See Inset Map III.) Ascending the St. Regis de Borgia R. to near its head, the new line deviates to the left from the Cœur d'Alène Branch of the Northern Pacific and crosses the crest of the Bitterroot Mts. by a pass which has been termed "St. Paul Pass" (elevation of tunnel, 4,125 feet, about 1,000 feet below summit of pass), leading to the East Fork of the St. Joseph R., which it descends through an unfrequented region to the main river, past the southern end of Cœur d'Alène Lake to Tekoa, Wash. (See Inset Map II.) Here the line enters upon the Columbia Lava Plain, which it crosses in a W. S. W. direction, reaching the Columbia R. at the mouth of Crab Creek. Crossing the Columbia it continues to Ellensburg, where it again meets the Northern Pacific line and parallels it in its ascent of the Yakima R., again deviating from it, however, in crossing the summit of the Cascades by Snoqualmie Pass (3,010 feet), 11 miles N. of Stampede



Railroad routes are compiled from the Post Route Maps of the Post Office Department. Situation is based on the state maps of the General Land Office and the topographic sheets of the Geological Survey.

Pass, used by the Northern Pacific. (See Inset Map I.) Seattle is reached by way of the upper Snoqualmie R. and the Cedar R.

The new line was built in remarkably short time. The 1,400 miles of the C., M. and P. S. Ry. between Mobridge and Seattle were completed in less than three years, between April, 1906, and March, 1909. Freight service was instituted in July of the latter year and continuous local passenger service has already been in effect for some time.

The distance between St. Paul and Seattle by the new line is 1,770 miles, as against 1,828 by the Great Northern Ry. and 1,911 by the Northern Pacific Ry. As its gradients are very favorable, the Chicago, Milwaukee and Puget Sound Railway will be seen to have every opportunity for competing with its rivals for the ever-increasing trade with the Orient.

W. L. G. J.

GEOLOGICAL SURVEY OF ALABAMA. The Alabama Legislature at its last session voted to expend \$10,000 annually for topographic mapping in coöperation with the U. S. Geological Survey, as has been done in several other States.

Mr. M. J. Munn of the U. S. Geological Survey has recently completed for the Geological Survey of Alabama a report on the natural gas field of Fayette County, which was discovered early last year. A *Bulletin* on good roads by Dr. W. F. Prouty, is nearly completed.

GEOLOGICAL AND NATURAL HISTORY SURVEY OF CONNECTICUT. Prof. William North Rice of Wesleyan University, Superintendent of this Survey, informs the *Bulletin* that "the Survey is planning for the next two years to devote most of its appropriation to an investigation of the water resources of the State, both above and below the surface of the ground, in coöperation with the U. S. Geological Survey. The field work is to be done mainly by Mr. A. J. Ellis, under the direction of Prof. H. E. Gregory of Yale University. During the ensuing biennial term a small area in the vicinity of Hartford will be thoroughly studied. In subsequent years it is intended to extend the survey of the water resources over the entire State; and it is hoped that the great importance of the work will appeal so strongly to the public that a more liberal appropriation can be obtained from the Legislature two years hence. The fact that so many of our large towns have been, in recent years, threatened with water famine shows the timeliness of the proposed investigation.

"A number of Bulletins already contracted for are finished or nearly so, and it is hoped they may be published during the next two years."

STATE SURVEY COMMISSION OF MAINE. At the last session of the State Legislature the State Survey Commission and the State Water Storage Commission were consolidated. The work will hereafter be carried on under the direction of the latter commission.

THE OKLAHOMA GEOLOGICAL SURVEY. The Survey has four parties in the field this summer. Prof. D. W. Ohern, head of the Department of Geology at the State University, is doing areal mapping in the Vinita quadrangle (N. E. Oklahoma). The Pawhuska and Nowata quadrangles have been surveyed and the Claremore and Vinita quadrangles are being worked up this year. The area embraced includes the northern part of the Oklahoma oil fields.

Prof. C. H. Taylor of the University has a party in the Wichita Mountains (S. W. Oklahoma), investigating the granites there. He will prepare a *Bulletin* to be published by the U. S. Geological Survey on Oklahoma granites. The

Ohern and Taylor parties are coöperative, the expenses being shared by the Federal and Oklahoma Surveys.

Dr. J. W. Beede of Indiana University, the eminent authority on Permian, who has spent some years in Kansas, Texas and New Mexico studying this problem, is in central Oklahoma endeavoring to trace out the Pennsylvanian-Permian contact across the eastern part of the Oklahoma Redbeds. His party outfitted near the Kansas line and will work as far south as possible this summer.

Dr. C. A. Reeds of Bryn Mawr College, who has already spent five years studying the Hunton and Viola limestones in the Arbuckle Mountains, has a party in the same region this year. He has already published with the Oklahoma Survey and will shortly publish with the Federal Survey.

THE WIRE-GRASS COUNTRY OF SOUTH GEORGIA. Mr. Roland M. Harper has a paper in the *Savannah Morning News* (April 16, 1911) on the remarkable development in the wire-grass regions once supposed to be almost worthless. All these lands have sandy soil and open forests of long-leaf pine, carpeted with wire-grass, but they differ in topography and drainage. The region extends from near the Savannah River to the southwestern corner of the State, then through West Florida, southwestern Alabama and Mississippi into Louisiana. It is quite sharply distinguished from the lime-sink region bordering it on the inland side, but on the southeast it passes very gradually into the flat pine woods. It embraces about 1,100 square miles in Georgia, or nearly one-fifth of the State. Fifty years ago it was considered almost hopelessly sterile, and in 1860 the density of population was only about four to the square mile. When the richer limestone and red clay lands became settled attention was given to the once despised sandy lands simply because larger areas for cultivation were needed. The farmers learned to treat this land so as to get satisfactory results from it. It was more easily tilled than clay land, it did not wear out and wash away so rapidly, and commercial fertilizers have done much to make it very valuable. About 100,000 new settlers came in between 1890 and 1900, making the increase of population about sixty-two per cent. A few years ago several new counties were created in this area, and twenty-two new railroads now cross it in Georgia. The density of population of the rolling wire-grass country is now about thirty-one to the square mile, and the wire-grass farmers are boasting of the fertility of the soil which their grandfathers regarded as worthless.

ALTITUDES IN THE STATE OF WASHINGTON. The U. S. Geological Survey has just published *Bull.* 457, giving the results of spirit levelling in the State of Washington, 1896 to 1910, inclusive, compiled under the direction of R. B. Marshall, Chief Geographer, in coöperation with the State. The report gives the exact elevations above mean sea-level of about 1,700 points in different parts of Washington. This is one of a series of similar reports which will cover the results of spirit levelling by the Geological Survey in all parts of the country.

INCREASED METAL PRODUCTION IN THE UNITED STATES IN 1909. An advance chapter from "Mineral Resources in the United States, 1909" on "The Production of Metals and Metallic Ores in 1908 and 1909," by Waldemar Lindgren, shows that in 1909 the total production had a value of \$870,445,230; that for 1908 was valued at \$649,779,613. Pig iron led in 1909 both in quantity and value, the output being 28,638,883 short tons, valued at \$411,544,773, of which 27,689,883 tons valued at \$397,907,510 were derived from domestic ores. Refined copper, gold, silver and lead in value of production followed in the order named.

The following are statistics of ore production in our country (short tons) in 1909 as compared with 1908:

	1909	1908
Iron Ore	57,449,584	40,301,336
Copper Ore	28,025,092	22,358,857
Zinc and Zinc Lead Ores.....	10,679,608	8,157,963
Gold Ores	9,241,827	8,991,751
Lead Ores	5,811,687	5,082,853

FROST DATA OF THE UNITED STATES. Frost data are universally recognized as among the most important meteorological records, for upon the occurrence of first and last frost, and upon the length of the crop-growing season, depend the success or failure of many crops throughout the extra-tropical latitudes of the world. In the latest *Bulletin* (V) of the Weather Bureau, Mr. P. C. Day, Chief of the Climatological Division, has brought together and charted the "Frost Data of the United States" (Washington, D. C., 1911), and has also ascertained the length of the crop-growing season as determined from the average of the latest and earliest dates of killing frost. This study is a distinct step in advance, for hitherto the frost charts published by the Weather Bureau (as in *Bulletin* Q) were based in the main on data collected at the regular stations of the Bureau, about 150 in number, located primarily in the larger cities and towns. Obviously, such data are of far less value than those which can be obtained in the country, and in the new charts the observations made at about 1,000 cooperative stations scattered over the farming districts were summarized, the period covered by these records embracing usually 10-30 years. Thus the conditions resulting from the local topography have been brought out, and the actual facts of frost occurrence are far more accurately presented than heretofore.

The new *Bulletin* contains five charts, viz., average date of last killing frost in spring; average date of first killing frost in autumn; latest date at which a killing frost has occurred in spring; earliest date at which a killing frost has occurred in autumn, and the average length of the crop-growing season. These charts will prove more useful to agriculturists, and to the public generally, than the earlier ones. We now have actual conditions of frost occurrence, and can study, in a large way, the effects of topography, land and water, and of other controls. A brief discussion accompanies the charts. R. DEC. WARD.

RAINFALL, EVAPORATION, DRY FARMING. "The guidance of prospective settlers in regions of limited rainfall" was the object in the preparation of a recent *Bulletin* (No. 188) of the Bureau of Plant Industry, entitled "Dry Farming in Relation to Rainfall and Evaporation," by Lyman J. Briggs and J. O. Belz. The whole subject is of vital importance to thousands who are already living in the region west of the 100th meridian. The writers have shown their appreciation of the conditions in their recognition of the importance of the seasonal distribution of rainfall, the rate at which the rain falls, the amount of the run-off, and the amount of evaporation. Usually, the mean annual rainfall is the only feature of the precipitation which receives attention. A discussion of the annual rainfall in the dry farming regions of the United States is followed by a comparison of the monthly distribution of rainfall on the Great Plains, in the Intermountain and on the Pacific Coast regions. The relation of monthly distribution of rainfall to farm practice; of the character of rainfall

to its usefulness; the run-off during torrential rains; hail; evaporation in dry farming sections; evaporation as influencing agriculture in the Great Plains, and the relation of yield to rainfall—all subjects which have needed just such study—are clearly and briefly discussed. A series of small rainfall maps, by States, showing the mean annual rainfall by 5 inch isohyets, and also in figures, will prove extremely useful to farmers over the region here considered. These maps have the great merit of not being overloaded with details. Tabulated precipitation data for a large number of stations are also included. The *Bulletin* may be highly recommended for its brevity, clearness and compactness.

R. DEC. WARD.

CLIMATE OF PORTO RICO. The acquirement, by the United States, of the island of Porto Rico is bearing fruit in the excellent climatological studies which are being made there by Dr. Oliver L. Fassig, Section Director of the Weather Bureau at San Juan. There has recently been published by the Weather Bureau a twelve-page report (quarto) on "The Climate of Porto Rico," with three charts of temperature, winds and rainfall (mean annual temperature and prevailing winds; average annual extremes of temperature; average annual rainfall, 1900-1909), and one page of diagrams showing the monthly distribution of rainfall at twenty stations on the island. The same article has also appeared in "The Register of Porto Rico for 1910" (8vo, pp. 20), including a map of the island. Further, in the *Monthly Weather Review* for February, 1911, Dr. Fassig has a discussion of "The Normal Temperature of Porto Rico, West Indies," with charts of mean annual, January and July temperatures, and mean daily maximum and minimum temperatures.

R. DEC. WARD.

PROF. PITTIER'S INVESTIGATIONS IN PANAMA. Prof. H. F. Pittier, of the Bureau of Plant Industry, Dept. of Agriculture, who is engaged in a botanical survey of the Canal Zone under the auspices of the Smithsonian Institution, was, on his arrival, engaged by the Government of Panama to extend his investigations to the territory of that republic. In this connection he devoted his attention mainly to the province of Chiriqui, which he considers economically to be the salvation of the country, as the other provinces of the Republic are totally unsuited to agriculture. Chiriqui Volcano was ascended and its height tentatively determined as 3,374 meters (11,070 feet). Its character is totally different from that of its neighbor, the Irazú of Costa Rica, as it lies almost wholly in the sub-tropical zone of the Pacific Slope. The savannas sloping from its foot to the coast of the Pacific afford good illustrations of the desiccating influence of wind. During the dry season the soil becomes hard and bears only scant vegetation, while the isolated trees which occur are bent to leeward. The streams issuing from the volcano flow in deep ravines amid a rank vegetation. The calmness of the air, the luxuriance of the flora in these deep protected gullies present a striking contrast to the wind-swept barren plain above. (*Pet. Mitt.*, May, 1911.)

SOUTH AMERICA

PROFESSOR KÜHN IN THE ANDES. Prof. Franz Kühn of Buenos Aires, in February and March explored the section of the Andes lying N. of Mt. Aconcagua between 31°30' and 32°50' S. under the auspices of the Argentine Department of Agriculture. The route lay west from San Juan to Calingasta at the foot of the main eastern range, and thence mainly over transverse passes, two of which were hitherto unknown, to the line of the Trans-Andine Railroad. The detailed results will be published later. (*Pet. Mitt.*, May, 1911.)

WORK IN DUTCH GUIANA. The exploration of Southern Dutch Guiana, to promote which the Geographical Society of Amsterdam, together with the Surinam Committee, aided by the government of the Netherlands, fitted out seven expeditions during the last fifteen years, has just successfully been brought to a close, thereby eliminating the last unknown area from the map of this colony. [A brief notice of the termination of the work of Lieut. Eilerts de Haan appeared in the *Bulletin*, March, 1911, p. 136.]

One of the main results of the last expedition is the determination, by Lieut. Kayser and Dr. Hulk of the lower course of the Lucie River, discovered by Lieut. Eilerts de Haan in 1909, who had unfortunately succumbed to an attack of malaria incurred on this expedition. The Lucie River empties, as foreseen, into the Corentyne River, which forms the boundary between British and Dutch Guiana, but far more to the north than supposed, so that in its upper parts it must turn from its westerly to a northerly course, and either traverse or circumvent to the west the Wilhelmina Range. (*Pet. Mitt.*, April, 1911.)

DR. KOCH-GRÜNBERG RETURNS TO THE AMAZON BASIN. Dr. Koch-Grünberg, the ethnologist, started upon a new expedition into the upper Amazon Basin in April under the auspices of the Berlin Museum of Ethnology. He intends to penetrate to the headwaters of the Yapurá River, traversing to the upper part of the Guaviare River and, in descending, to explore the region on the divide between the Orinoco and Amazon systems and their affluents, in particular the Inirida of the former and the Guainia and Uaupés of the latter system. (*Pet. Mitt.*, April, 1911.)

EXPLORATIONS IN BOLIVIA. Dr. T. Herzog, the German botanist, who undertook an exploring expedition in Bolivia in 1907, has resumed his investigations. Although botany is his prime interest, he is also devoting attention to the topography and the aborigines of the country. In the autumn of 1910 he started from the northernmost point in Argentina to be reached by railroad, near Oran, Salta Province (23° S.), and followed the eastern rim of the Cordillera for a distance of over 350 miles to Santa Cruz de la Sierra ($17\frac{3}{4}^{\circ}$ S.), which he reached Feb. 26th of the present year. The record he has kept of his route, supported by various determinations of latitude and mountain ascents allowing of sketching the surrounding country, will enable him to represent the position of the eastern rim of the Cordillera more accurately than has been done heretofore. Resuming his journey he intends to travel to the W. N. W. via Cochabamba to La Paz, and will endeavor to locate the divide of the Sierra de Cochabamba. (*Pet. Mitt.*, May, 1911.)

RELIEF MODEL SHOWING THE EFFECTS OF THE VALPARAISO EARTHQUAKE. Mr. G. C. Curtis of Boston, Mass., whose paper on "Land Reliefs that are True to Nature" was published in our June number, has just completed and installed in the Harvard Geological Museum a relief showing the effects of the earthquake at Valparaiso. It was made under the supervision of Professor J. B. Woodworth, and is a geographical "bas relief," to use the terms of figure sculpture. The relief shows the broken buildings in the foreground, the city in the middle distance, with roadstead and shipping backed by the sea horizon in the distance.

AFRICA

MAJOR GORDON LAING'S GRAVE DISCOVERED. *La Géographie* (No. 3, 1911) reports that M. Bonnel de Mézières was recently charged by Governor Clozel

of Haut-Sénégal-Niger with the work of making a study of the salt mines of Taudeni and was further instructed to make special inquiries concerning the death of Major Alexander Gordon Laing, who, it will be recalled, was murdered in 1826, on the third day after he had left Timbuktu to return to Tripoli, whence he had started southward across the Sahara in the previous year. This fact was known from native reports, but nothing further had been learned of his fate.

On his way north to Taudeni, M. Bonnel de Mézières examined certain records at Arauan, from which he read that Laing had been assassinated and buried at a place called Saeb, about 30 miles north of Timbuktu. This information was confirmed by natives whom he met, and he was able to discover the scene of the assassination and the place where the body had been buried. The remains of Laing were found about 3 feet beneath the surface.

Laing was born at Edinburgh on Dec. 27th, 1794. He was sent as a Lieutenant of Infantry to Sierra Leone, where Sir Charles MacCarthy, Governor General of the British possessions in West Africa, sent him on a mission to study the sources of the Niger (1821-1822). He wrote a very interesting account of these travels entitled "Travels Through Timannee, Kooranko and Soolima countries in Western Africa" (London, 1825). In 1823 he took part in the war against the Ashantis, and the British Government sent him in 1824 to cross the Sahara from Tripoli to Timbuktu. He reached that town on the southern edge of the Sahara on August 18, 1826. On Sept. 24th he was assassinated in the desert. When Dr. Oscar Lenz crossed the Sahara to Timbuktu in 1880-1881, he sought in vain for traces of Laing.

PROF. HANS MEYER RETURNS TO AFRICA. This well-known geographer, who made the first ascent of Kilimanjaro, the highest mountain in Africa, started in May on his fourth journey in East Africa. After reaching Bukoba on the west shore of Victoria Nyanza he proposes to travel to Lake Kivu and the Kirunga group of volcanoes in order to study the relations of the volcanic phenomena to the tectonic structure of the western rift system at this point. From Lake Kivu his expedition will go to Lake Tanganyika, and if possible also to Lake Nyasa. Besides geological investigations, the botany, zoology and ethnology of the regions traversed will also receive attention.

THE FRENCH SAHARA. M. N. Villate gives an account of his recent journeys from Tidikelt to the Niger by the Ahaggar, and adds to our accurate knowledge of the French Sahara. His object was to extend the network of astronomically determined positions, and he succeeded in obtaining the latitude and longitude of forty-nine points. Equal altitudes of stars were observed for latitude and chronometer correction; longitudes were obtained when practicable by occultation of stars, and chronometer watches furnished a means of determining the difference of longitude between neighboring points on the route. Observations were also made of the magnetic declination, inclination, and horizontal force at some thirty-five to forty points from Biskra in the north, to Gao on the Niger in the south. In consequence of changes which were found to have taken place in the magnetic moment of the magnets during the journey, values of the horizontal force can only be given to three places of decimals of C. G. S. units. (*La Géographie*, No. 3, 1911.)

EXPLORATIONS IN THE LAKE CHAD REGION. Miss Olive MacLeod, who, with Mr. and Mrs. P. A. Talbot, has been exploring the country round Lake Chad

for several months, returned to England on Tuesday. The expedition passed up the Niger and Benue Rivers by steamer and canoes, through Southern and Northern Nigeria, and then traversed the North Kamerun. French Ubangi was reached in October last. A splendid reception was accorded to the party by the Lamido at Lere. The mysterious falls on the Mao Kebi were located, and have been named Les Chutes MacLeod. After mapping this part of the river, the party went through the Tuburi Lakes and down the Logone to Fort Lamy. The expedition then proceeded down the Shari to Lake Chad, which was crossed, in Kotoko canoes, from the Shari to Saiyorum. Close studies were made of the various peoples visited, especially of the little-known tribes of French Central Africa and the Baduma of Lake Chad. A large collection of objects of ethnological interest was made, especially of musical instruments, while typical examples of music were taken down. A botanical collection of several thousand specimens has been sent to the British Museum, as also a number of birds, beasts and reptiles. A route-sketch was made across Lake Chad, and a survey by plane table and theodolite from Maifoni to Kano. (*Nature*, May 11, 1911.)

ASIA

PETROLEUM NEAR THE GULF OF SUEZ. Petroleum deposits have long been known to exist on the west coast of the Gulf of Suez, but it has not been believed till recently that they were important. Within the last two years, however, fresh borings have been made in Gensah Peninsula, about 165 miles from Suez, and at a depth of 1,265 feet a fountain was struck which threw up a column of oil 100 feet high. This oil contains a large proportion of benzine and is free from water. Another well at Gensah is yielding about 600 tons per day. These wells are near the coast, and the intention is to work them next year. Reservoirs and refining works are being erected at Port Tewfik, near Suez. Experimental borings are now being made at Jebel Zeit on Gaysum and Taouila Islands and at Abou Zenima, 60 nautical miles from the coast. (*Les Matières Grasses*, Vol. IV, p. 2129.)

GROWTH OF THE MANILA HEMP INDUSTRY. Mr. Wileman, British Consul at Manila, reports that during the past few years the production of hemp in the Philippines has been steadily increasing. The production in 1909 was 1,280,000 bales; in 1910, 1,340,000 bales, and it is expected this year to reach over 1,400,000 bales. The weather of the past few years has been especially suitable for Manila hemp growing, and though the price of the commodity has fallen considerably, the tendency to increased production is not checked.

AUSTRALASIA AND OCEANIA

RAINFALL OF NEW SOUTH WALES. The rainfall of New South Wales has been carefully studied and discussed, in tabular and cartographic form, in a recent publication of the Commonwealth Bureau of Meteorology of Australia, by Henry A. Hunt, Commonwealth Meteorologist (*Results of Rain and River Observations made in New South Wales during 1903-1908*, 4to, 1910). The volume contains all available rainfall totals up to the end of the year 1908, from 2,298 stations. Annual and monthly summaries and maps are given for each of the years 1903-1908. On the annual maps there is an innovation which adds much to their value, the regions which had an excess of rainfall above

the mean annual amount being colored pink. The chart which will be most generally useful is a large one showing the average annual rainfall (in figures and by means of isohyets) for New South Wales up to the end of 1908. The number of stations whose records were used is 1,078. The principal object in compiling these maps was an economic one. If the 15-inch mean annual rainfall line be taken as the limit of successful wheat-growing (an assumption which is, of course, reasonable only with many qualifications), there exist to the westward of this line, in New South Wales, some 50,000 square miles of country "open for wheat prospecting, with probabilities of satisfactory results." In addition, the volume contains curves showing the height of many of the rivers for each year of the period 1903-1908.

R. DEC. WARD.

EUROPE

THE NEW TUNNEL IN THE ALPS. On March 31 last, the workmen who have been excavating the tunnel of Loetschberg, met under the Bernese Oberland, having finally pierced the tunnel which is to form part of another connection between Italy and Northwest Europe. The work of excavation, begun on Nov. 1, 1906, has had only one serious interruption, and that was when the breaking down of a part of the tunnel in July, 1908, admitted the waters of the Kander River and made it necessary to deviate to some extent from the line of construction as originally planned. The tunnel will not be ready for railroad service till 1913. Its length is 14½ kilometers, or about 9 miles. Sections of railroad are now building to connect the tunnel with Brigue on the south and with Frutigen on the north, and when the whole enterprise is ready for operation in 1913 trains will pass through the Simplon and Loetschberg tunnels, and Italy will have a new outlet to the north by way of Brigue, Bern and the Rhone Valley saving several hours time between Milan and Paris. The enterprise has been largely promoted by the business interests of Bern, which will thus be placed in direct relations with Northern Italy.

POLAR

THE FRAM RETURNS TO BUENOS AIRES. A Reuter message reports the arrival of the *Fram* in Buenos Aires about the middle of April, after leaving the Amundsen expedition at King Edward VII Land. The vessel intended soon to leave Buenos Aires for scientific work in the Atlantic between Africa and South America. Her commander, Capt. Nilsen, expects to return to the Argentine capital and will start south from there about Oct. 1, to bring Capt. Amundsen and his party back north. It is expected that he will go through the Pacific on his way to the Arctic Ocean through Bering Strait stopping at San Francisco to take on supplies.

PEARY THANKED AND HONORED BY CONGRESS. Before Congress adjourned in March, it passed a bill to retire Commander R. E. Peary with the rank and pay of a Rear Admiral and to extend to him the thanks of Congress.

MR. LEFFINGWELL ON THE ARCTIC COAST. Dr. C. W. Leffingwell sends to the *Bulletin* a letter from his son, Ernest DeK. Leffingwell, written at his camp on Flaxman Island, north coast of Alaska, on Oct. 20th, 1910, containing some information supplementing our previous report (*Bulletin*, March, 1911, pp. 199-200). After returning to Flaxman Island from his survey trip to the west

he built at Flaxman a storehouse, added a second floor to his cabin, and put everything in good condition for the winter in camp. His food stores for the winter consisted of flour, with a fair amount of caribou, duck and fish, and seals for dog feed. He expected to spend most of last winter in astronomical work and the mapping of his surveys.

RETURN OF THE JAPANESE EXPEDITION. According to a Reuter despatch, the Japanese Antarctic Expedition abandoned the idea of attempting to reach the South Pole and arrived at Sydney on their return on April 30th. Their schooner, the *Kainan Maru*, which started South from New Zealand in February, was obliged to turn back on account of ice packs and icebergs. The decision to return was also influenced by the fact that ten of the twelve dogs which they had taken along as a sledge team succumbed to the cold. The *Kainan Maru* cruised for four days in the vicinity of Coulman Island, South Victoria Land, and then started for Sydney.

OBITUARY

WILLIAM GÖTZ. Professor Wilhelm Götz died in Munich on March 25. Since 1900 he had filled the chair of geography in the Polytechnic Institute of that city, after ten years in the same position in the Royal Bavarian Military Academy. Professor Götz's investigations were mainly devoted to economic and historical and to local regional geography. His most important contributions to science are his *Manual of Economic Geography*, his treatise on the routes of world commerce ("Verkehrswege im Dienste des Welthandels," 1888), his *Historical Geography* (1904), his *Geographico-Historical Manual of Bavaria* (2 vols, 1895 and 1898) and his *Regional Geography of Bavaria* (1904). (*Pet. Mitt.*, April, 1911.)

PERSONAL

Prof. C. H. Hitchcock, Emeritus Professor of Geology at Dartmouth College, has come East from Hawaii to complete his field work for the Geological Survey of Vermont. His address for the summer will be at Hanover, N. H.

Sir John Murray has presented a fund of \$6,000 to the National Academy of Sciences for the purpose of founding an Alexander Agassiz gold medal to be awarded to scientific men in any part of the world for original contributions to the science of oceanography.

Dr. Walter S. Tower, Assistant Professor of Geography in the University of Pennsylvania, whose paper on "Scientific Geography" was published in the *Bulletin* last year (p. 801), has been called to the University of Chicago.

Mr. F. E. Matthes of the U. S. Geological Survey has delivered a course of twelve illustrated lectures, with laboratory work, before the students of the University of Michigan on "Topographic Mapping."

Dr. John M. Clarke, State Geologist of New York, gave an illustrated lecture before the Departments of Geology and Biology of Colgate University on May 3d. His subject was "The Magdalen Islands and the Bird Rocks."

Dr. Otto Quelle, whom many American geographers met at the Eighth International Geographical Congress (1904) in this country, has been appointed

assistant at the Geographical Institute of the University of Bonn, retiring from the editorial staff of *Petermann's Mitteilungen*.

Lord Curzon of Kedleston has been elected President of the Royal Geographical Society in succession to Major Leonard Darwin.

GENERAL

ATLAS OF PORTOLAN CHARTS. The Hispanic Society of America has just produced, under the editorship of Edward Luther Stevenson, Ph.D., a facsimile of one of the most interesting and valuable atlases of these charts, the property of the British Museum and entered as Egerton MS. 2,803. The announcement of the publication says that the atlas, though neither signed nor dated, bears striking resemblance to the work of Vesconte de Maiollo, and appears to have been constructed as early as 1508. "If this date is correct, it is not only the oldest known Portolan Atlas, on whose charts any part of the New World is laid down, but the oldest known atlas in which the coast regions of a very large part of the entire world are represented with a fair approach to accuracy."

Four special charts exhibit parts of the New World coasts, and the Atlantic coast line is sketched on the world chart from Labrador to the La Plata River. The twenty charts also include the Black Sea, the Caspian Sea, the Mediterranean, charts of Spain, the British Islands, the Baltic, the west and the east coasts of Africa, also India and the eastern Asiatic coasts as represented by Cantino and Canerio. The reproduction is an artotype facsimile issued in the size of the original in an edition of 110 copies, with a brief introduction and list of the charts. Portolan charts may rightly be called the first scientific charts or maps of modern times; and it is gratifying that this superior example of the earliest modern atlases is now placed within reach of a limited number of our libraries and collectors.

PROGRESS IN GEODESY. At a meeting of the Research Department of the Royal Geographical Society on April 27, Mr. A. R. Hinks discussed recent progress in geodesy. Invar tapes and wires have revolutionized base measurement; gravity surveys have been carried out over large areas, while abnormalities of gravity in more restricted regions have been determined with remarkable accuracy by the torsion balance; arcs of meridian have recently been measured in Spitzbergen, Africa and Peru. In view of so much activity in geodetic work, it is to be regretted that so little has been done of late years in the United Kingdom. The measurement of an arc of meridian and a detailed gravity survey were instanced as pieces of work which should be carried out in the British Isles and discussion on these matters was invited. (*Nature*, May 4, 1911, p. 318.)

GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY)

BOOK REVIEWS AND NOTICES

NORTH AMERICA

Streifzüge durch das nordamerikanische Wirtschaftsleben. Von Dr. Ernst Schultze. xxii and 226 pp. Buchhandlung des Waisenhauses, Halle a. d. S., 1910. M. 5.

The book contains a collection of articles on economic and social problems of the United States, railroads, waterways, coal famine, land frauds, forestry, trusts, pure food laws, labor problems, etc. They appear to have been chosen at random from the wide field of the author's knowledge of American conditions, without aiming at any unity of purpose or scope. Some of them are mere sketches, others regular short treatises; but they are all entertainingly written, and will probably be read by many who would shrink from more serious literature on the same subject. The book is to be welcomed, therefore, as a possible instrument for the propagation of a better understanding of American ways and conditions among the general public; but it must be hoped that the author will be able some day to write a regular economic geography of the United States from the European point of view, which has not yet been written, and for which nobody, perhaps, would be more competent than he.

M. K. GENTHE.

The Expansion of New England ; the Spread of New England Settlements and Institutions to the Mississippi River, 1620-1865, by Lois Kimball Matthews, Instructor in History in Vassar College. Pp. 303, maps 29. Houghton Mifflin Company, Boston and New York, 1909. \$2.50.

During recent years there have been many valuable contributions either direct or indirect to the geography of the United States. A few contributions have been written with a geographic purpose, many have been written with the geographic element well in view, and many more with but little conscious recognition of geography, yet containing much material capable of geographic interpretation. The book under review is of interest to geographers from the latter point of view.

The distribution of New Englanders east of the Mississippi up to 1865, the influences of their religious and educational ideals, and of their political organizations are the main subjects of Miss Matthews's treatment. The treatment is chronological. For the most part one must read between the lines in order to understand the many potent geographic influences that directed and influenced the westward movement from New England.

The first swarming from the coast avoided the Worcester Plateau and entered the Connecticut Valley, this movement being influenced by the fur trade, the ease of travel along and upon the river and by the attractive "intervale"

lands in the valley. Reading between the lines the term "intervale" is seen to be equivalent to the flood plains and terraces along the Connecticut. The farm holdings were narrow rectangles extending from the river across the flood plain to the gravelly and sandy terraces upon which the buildings were usually located.

The westward movement from New England avoided the Berkshire Plateau and entered New York from Pennsylvania and Lake Champlain. Passing up the Susquehanna Valley, settlers crossed the divide into the valley of the Genesee. The great movement in New York was along the Mohawk Valley and Ontario Plain to Buffalo.

Three routes led to what was then the far west, the Braddock Road, the Ohio Valley and the Mohawk-Great Lakes, the latter being by far the most important. The excellent population maps bring out at a glance the effect of this latter route which peopled with New Englanders the northern portions of Ohio, Indiana and Illinois. A large influx of Southerners have peopled the southern parts of these States. For a time there was a sharp contest between the county system of the South and the town meeting system of the New Englanders.

Another interesting fact not specifically mentioned is that, in large part, the New England migrations were to regions which are like the home region, glaciated regions. Topographic resemblances between western New York and New England are repeatedly noted. A congregation of Granville, Mass., in the eastern part of the Berkshires, selected a similar location at Granville, Ohio, because the latter location had a "peculiar blending of hill and valley," to which they were accustomed. The vicinity of Beloit, Wis., on an outwash plain was selected for its level fields, water power, "unlimited gravel," and "New England look."

Many other interesting geographical relations come out in reading this book, relations that need no great geographical training for their interpretation. The author is a student of Professor Turner, who with his students have done such good work in the geographical interpretation of United States history. It is a matter of some surprise, therefore, that in the problem of distribution so little emphasis is placed on important earth factors. To take a single example, the Erie Canal as a directing factor receives scarcely more than a paragraph.

The book is a welcome contribution to historians, and no less welcome to geographers, because it assembles so many facts capable of geographic interpretation. The accumulation and assembling of material represents much labor, the style and arrangement make a most readable book.

F. V. EMERSON.

The Story of Old Kingston. By Agnes Maule Machar. 291 pp., illustrations and appendices. The Musson Book Co., Ltd., Toronto, 1910. \$1.50.

The Story of Old Kingston is an account, more historical than geographical, of the growth of Kingston, once the capital and long the leading city of "Upper Canada." The story begins with the founding of Fort Frontenac in 1673, and follows the history of the city until about 1850, with the greater emphasis given to the earlier years, and with special attention to the War of 1812. The author writes with a skilled hand, and has made good use of historical materials. Many of the descriptions are not only interesting in themselves, but are ex-

pressed in such excellent form that they are really literature. The volume should be particularly appealing to those who know and love the City of Kingston.

R. E. DODGE.

The Old North Trail; or Life, Legends and Religion of the Blackfeet Indians. By Walter McClintock. xxvi and 539 pp. illustrations, map, appendices and index. Macmillan & Co., Ltd., London, 1910. \$4. 9½ x 5½.

The sub-title describes its real content. The author was adopted into the Blackfeet Indian tribe, secured their confidence, and is thus able to write authoritatively on their home life. The social life, religion, customs, traditions and history of these Indians is told in an interesting, unconventional manner. Such a book is especially useful, since the Blackfeet are rapidly disappearing, and the remnant is becoming civilized and forgetting the life and traditions of their fathers.

F. V. EMERSON.

Cuba. By Irene A. Wright. xiv and 512 pp., 1 map, 72 illustrations, index. The Macmillan Company, New York, 1910. \$2.50.

In the opinion of the able journalist-editor who wrote this book and who has gathered her impressions of Cuba during ten years' interrupted residence on that island, Havana's population is "diseased, physically and morally, and also mentally." She asserts that such literature as is not printed in English is displayed on the public stalls; that Havana is rotten and rotting, and that those who note intelligently even the surface signs of existing conditions see all her undeniable beauties through thick miasma. In utter disgust she has repeatedly said "farewell forever" to the Queen of the Antilles; but, as she frankly admits, "each time, before I'd lost her well astern, I realized that I should return. Arrived in the North, the bustle of busier streets than hers annoyed me; brick and brownstone houses oppressed me with their gloom." Invariably she found herself longing to see the Cuban sky again, because all others looked faded in comparison—less blinding at noonday, less gaudy at sunset, and less deep, tender and marvellously blue at night. When she had planned to return to her native land, the palm trees of Havana's suburbs, "with feathery tops that rustle in the wind have haunted my dreams until longing for the light, the color, the warmth of Havana was a pain not longer to be endured." We regard it as a fortunate circumstance that the tinted façades of the houses, the climate, the sky, and the tops of royal palms proved to be a mandate compelling such a well-trained observer and entertaining writer to complete her Cuban studies. Beside the chapters devoted to the capital, this volume contains descriptions of all those portions of the island, in the west and in the east, which are especially interesting to American readers. The Isle of Pines is, of course, not slighted, and there are chapters dealing with the "farce" of Cuban autonomy, as well as (somewhat casually) the riddle of Cuban ethnology.

M. W.

SOUTH AMERICA

Climate of the Argentine Republic. By Walter G. Davis, Director of the Argentine Meteorological Office. Pp. iii, pls. xlv. Buenos Aires, 1910. 4to.

Argentina, with its great north and south extension; its massive western Cordilleran barrier, and its importance, because of its "temperate zone" location, as a future home for a vast and energetic population, has a peculiar inter-

est among South American republics. Climatically, the Argentine Republic offers an unusually attractive field for study, and under the able directorship of Mr. Walter G. Davis, the Argentine Meteorological Office has gained the distinction of having done by far the best meteorological work in South America, and better work, even, than has been done in many Northern Hemisphere countries. Not content with covering the mainland of his great district with meteorological stations, Mr. Davis has extended his service into the Antarctic province to the south, and is every year adding to our knowledge of the meteorological conditions which prevail in the high southern latitudes. For comparatively few countries are there available such admirable climatic publications as the Argentine Meteorological Office has given us in the past few years. In the "Second Census of the Argentine Republic, May 10, 1895," there was an excellent chapter on climate (published in 1908). This chapter, revised to the end of 1900, was published separately, in English and Spanish, in 1902. We now have another, more complete, publication in the *Climate of the Argentine Republic*, dated 1910, altogether in English, fully illustrated with charts of temperature, pressure and rainfall; curves of temperature, pressure, relative and absolute humidity, wind roses, etc.

The Republic is divided into four zones, the Littoral, the Mediterranean, the Andean and the Patagonian, with a fifth, the Antarctic. The first three are further divisible into northern, central and southern sections. Argentina, it should be remembered, has many climatic characteristics similar to those found in the United States and Canada, with this difference, that in the South American Republic the narrowing of the continent to the south results in reducing considerably the longitudinal extension of some of these climatic provinces as compared with their east and west extension in North America. Thus, we have in southern Argentina a climatic province very similar to that of eastern Canada, but the former is much the narrower. On the other hand, much of northern Argentina belongs to a climatic province very similar, in its larger features, to that between the Rocky Mountains and the 100th meridian in the United States, but in Argentina this district is a good deal more extended than in the United States. Again, in northeastern Argentina and part of southern Brazil there is a climatic province which we also find, with a considerably greater east-west extension, in the eastern United States from the 100th meridian to the Atlantic Ocean. Such broad climatic comparisons as these make the world-wide study of climates interesting, and economically of great significance.

Those who wish to inform themselves concerning the climatic conditions of the Argentine Republic, for reasons of agriculture, cattle raising, manufacturing, or even only of health and pleasure, will find Davis's new volume indispensable. We are particularly glad to see in it a classification of the types of cyclones and anticyclones which control Argentine weather, for climatic averages without clear emphasis upon the weather types which, taken together, make up the climate, are dull and dead.

R. DEC. WARD.

Au Brésil. Du Rio São Francisco à L'Amazone. By Paul Walle, author of "*Le Pérou Economique*," etc. 464 pp., 105 illustrations and 13 maps. E. Guilmoto, Paris, 1910. 10 fr.

This volume is a part of the outcome of very careful studies which the author made in the course of long journeys undertaken at the request of the French Ministry of Commerce and the Parisian Society of Commercial Geog-

raphy, his assigned task having been to observe, not only the progress, the resources and economic situation of the Brazilian States, but also the commercial methods employed by "foreign competitors" of France in Brazil.

The southern regions, below the S. Francisco River, formed the subject of an earlier volume ("De l'Uruguay au Rio São Francisco"), which the present publication supplements on a scale even more liberal than its title indicates. For example, the Aricary region (fondly known to some of its inhabitants as The Free State of Counani), north of the Amazon, and Acre in the extreme west, receive M. Walle's attentive consideration. M. W.

AFRICA

Manual Labour in S. Thomé and Príncipe. By Francis Mantero. Translated from the Portuguese. 183 pp., illustrations, maps and index: Printing Office of the Annuário Commercial, Lisbon, 1910. 11 x 8.

Some writers have charged that the Portuguese Government, importing black labor from Angola and other regions of Portuguese Africa, to the Cacao Islands of São Thomé and Príncipe, has reduced these men and women to a state of slavery, and imposed upon them excessive labor and other hardships resulting in excessive mortality. This indictment has been supported by persons who claim to have been eye witnesses of cruelty inflicted upon the black work people.

This book was written by a member of the Portuguese Committee appointed by Conselheiro Francisco Dias Costa, head of the Colonial Department from 1889 to 1910, to investigate these charges and to report upon all questions relating to colonial manual labor. The author makes a very spirited defense of the Government and the planters against the serious charges which English, American and other writers have made. He denies these charges *in toto* and undertakes an investigation of all phases of the labor question to show that, under the policy of the Government, the alleged inhumanity of the labor system in these islands is not borne out by the facts. He goes further and asserts that in no other African colony does the native workman enjoy so many advantages as expressed in the conditions of his work, his treatment, housing, remuneration and general well-being as are offered to the toilers on the plantations of São Thomé and Príncipe. It is well to have the Portuguese side of this story so fully set forth.

In a geographical sense the book is a welcome addition to our literature on these islands. It contains helpful maps on a large scale, many fine photo-engravings showing aspects of the islands, and especially of their industrial development; and the natural conditions favorable to great productivity are fully described.

From Hausaland to Egypt, through the Sudan. By H. Karl W. Kumm, Ph.D. xi and 324 pp., maps, illustrations and index. Constable & Co., Ltd., London, 1910. 16s. 9½ x 6½.

This book gives an account of a journey across Africa from the mouth of the Niger to Khartum on the Nile. The author's first duty was to visit the Mission stations in Northern Nigeria and establish a Freed Slaves' Home there. After calling at the missionary stations, the real journey across Africa began, from Dampar on the Benue River in February, 1909, by boat up the river. Late in March, the river was left and the journey was continued by caravan through the mountains of Adamawa until the Shari River was reached. By

the middle of April the trip up the river was begun, and within a month the party were at Fort Archambault. After a long halt, Fort Archambault was left in July, and the hazardous part of the trip was undertaken across an unknown land, to Wau, a British outpost on a branch of the Nile. This settlement was reached early in October, after encountering many serious difficulties which arose largely because of the season of the year; thence the journey around the sudd, to the White Nile, and down the Nile to Khartum by steamer was accomplished without danger.

Throughout the text, three interesting themes are traceable: the character of the native tribes, the hunting of the big game of the French Sudan and the experiences of the rainy season. The tribal characteristics of the people along the border line between Mohammedanism and Paganism are carefully recorded. Most of the tribes belonging to the Semitic, the Hamitic or the Bantu branches of the human family, the last of these being distinguishable from the others by their tribal markings, which consist of hair-dressings of fantastic design and cicatrices. The vocabularies of a few tribes and some of their common proverbs are collected in an appendix. The reports of the chase are interesting, and when the game can fairly well take care of itself, and it is sometimes a question which is the hunter and which the hunted, the excitement becomes intense. Much information is given concerning various kinds of animal life and their haunts, and a definite picture is painted for the reader. Appendix C gives a list of zoological specimens. These are mostly butterflies, and there are handsomely colored plates of them. The journey was made during the rainy season, and Dr. Kumm gives a vivid impression of the copiousness of the rainfall and the intensity of the wind and lightning. In Appendix B are tables of meteorological observations, with graphs of temperature, barometric pressure and rainfall. The daily record, kept from April 18th, 1909, at Shari Andja, to October 9th, when the real journey was ended, contains valuable information. The book also includes a brief review of previous journeys in this region, a short history of the land of Cush, and a chapter on the mineral and botanical wealth of the Central Sudan. The caravan was augmented by men, women and children, who, on their way to Mecca, desired to join it in order to lighten their pilgrimage, and a chapter is given on this religious observance. There is a carefully constructed map and numerous illustrations of the native peoples and villages.

R. M. BROWN.

Cecil Rhodes. His Private Life by His Private Secretary, Philip Jourdan. 293 pp., illustrations and index. John Lane Company, New York, 1911. \$2.50. 9 x 6.

The writer of this sketch of Cecil Rhodes is a hero-worshipper and the volume is a panegyric. Other biographies of this great man have been written, and it has not been easy for the authors to refrain from excessive laudation. Rhodes's private secretary, however, who was for eight years the constant companion of the man, and who received much through his generosity, makes no effort to separate himself from the glamor of the subject. The author's main object in writing the book is to refute the "unjust and iniquitous misstatements" which were being disseminated. No attempt is made in the book to discuss the political situations of South Africa; but the home life of Rhodes, his life on the plains, his journeys, conversations and discussions between friends, and his acts of generosity and sympathy are portrayed minutely and intimately. From

all these situations from Rhodes's private life, Jourdan deduces the character of the great leader. He interprets Rhodes's feelings concerning the Jameson Raid, and gives in detail the difficulties while under martial law during the Kimberley siege. Most of the chapters are based on experience and contain valuable information concerning this great imperialist.

R. M. BROWN.

The Pre-Historic Period in South Africa. By J. P. Johnson. 89 pp., illustrations and index. Longmans, Green & Co., London, 1910. \$3. 10 x 7½.

This book is a brief summary of the knowledge of the pre-historic period of South Africa. Brief chapters on the Eoliths of Leijfontein, Acheulian Implements (carefully worked flints), Acheulian and Solutrian (Cave) Groups, Solutrian Sites, Petroglyphs and Rock-Paintings and the Pre-Historic Bantu comprise the volume. A large percentage of the pages is given to illustrations—forty-seven in all, with six plates. The illustrations are of different types of implements, including arrow-heads and scrapers of the three phases of development, and many rock engravings, mostly of animals. These petroglyphs and rock-paintings are distributed throughout the length and breadth of South Africa, and in Chapter IV brief descriptions of some of the typical occurrences are given. The evidences of the former wide-spread population of the country by the Bantu or Kafir peoples are detailed. These evidences relate to agricultural activity, remains of mining and smelting operations, ruins of cattle pens, forts and fortified kraals and ornaments, weapons and pottery. The ruins and forts are carefully described by the aid of plans and photographs. An appendix is added, in which the author, assuming that the pre-historic bush land was similar to the present bush country, gives an account of a journey through the northeast bush region in order to supply a picture of the conditions under which the early Bantus lived. The sites described are in the main found on the high veld or in the bush country.

R. M. BROWN.

The Yellow and Dark-Skinned People of Africa South of the Zambesi. A Description of the Bushmen, the Hottentots, and Particularly the Bantu, with fifteen plates and numerous Folklore Tales of these different people. By George McCall Theall, Litt.D., LL.D. xvi and 397 pp., and index. Swan, Sonnenschein & Co., Ltd., London, 1910. 8½ x 5½.

A valuable and thorough investigation of the dark races of Africa. Three main lines are considered: The Bushmen or aborigines, the Hottentots and the Bantu tribes. Four-fifths of the book is an account of the Bantu peoples. A study of them is considered most important, because the Bantu outnumber by more than threefold all the other inhabitants, and are increasing at a rapid rate. The early record of the three tribes is given, and all evidence bearing upon the origin and early migrations of the races is discussed, and this is followed by a statement of their later history. Then, in detail, are noted many characteristics of the tribes, their form of government, language, skill in various occupations, play, superstitions, vanity, domestic life, in fact a great array of carefully made observations. Some of the folklore tales, which can be interpreted easily in terms of the stages of civilization, are added. An interesting chapter at the close of the Bantu narrative discusses the enormous rate of increase of the Bantu tribes. This is figured in terms of the ratio of children under fifteen, to females over that age. This ratio is in England approximately 110 to 100; in the United States, 130; among the negroes of the United States,

172, and under ordinary circumstances among the Bantu tribes, 195. The final chapter of the book is headed "The Mystery of South Africa," and is a statement of the ruins of mines and forts which are found throughout certain areas, and which point to a former occupancy of the country by a people somewhat advanced in civilization. The book contains fifteen illustrations.

R. M. BROWN.

ASIA

Among Indian Rajahs and Ryots. A Civil Servant's Recollections and Impressions of Thirty-Seven Years of Work and Sport in the Central Provinces and Bengal. By Sir Andrew H. L. Fraser. xv and 368 pp., illustrations and a map, and index. J. B. Lippincott Company, Philadelphia, 1911. \$4. 9 x 6.

A story of experiences and observations in India. The style is the simple, direct one of a man of affairs. Anecdotes of places and men, local history and experiences, and general observations make up the twenty-four chapters. The author occupied judicial and administrative positions which afforded him facilities for an intimate observation of Indian life, both private and official. The geographical element in the book occupies a minor rôle, although here and there are geographical items and some of the excellent half-tones have geographic interest.

F. V. EMERSON.

Histoire de la Mission du Thibet. Deux volumes. Par Adrien Launay, de la Société des Missions Étrangères. Vol. I, iv and 470 pp. Vol. II, vii, 440 pp., 1 illustration, map and appendix. Société Saint Augustin, Desclée, de Brouwer et Cie, Lille-Paris, 1909. 15s.

The message of this book is religious, rather than geographical. It gives a detailed report of the various attempts of Catholic Missionaries to penetrate into Tibet, of their heroic efforts and sufferings on behalf of a cause that was doomed to fail from the very beginning. In spite of the admiration of the personal courage and devotion of those men, the unprejudiced reader finds in every chapter of the sad story the proof of their lack of judgment and knowledge concerning the people they wished to convert, and of their entire inability to appreciate the point of view of a race like the Tibetans. While it is certain that the difficulties which stood in their way would have been too great for anybody, there is no doubt either that with an equal lack of tact and wisdom in dealing with the people and its authorities, they would have failed likewise on less hostile territory.

Thus, even the orthodox author is bound to admit that "Catholicism has not been seriously planted in Tibet; that even the comparatively most important results were pitifully small and ephemeral." They were limited to ordinances in favor of the missionaries, which were never carried out; exchanges of diplomatic messages, more worthy of note on account of their curious form than their political importance; very rare conversions, without any bearing on the religious or political situation. Finally, nothing is left of the whole enterprise save a few parchments, relations of missionary travels, and the name of "Tibetan Mission," even this, though, in application to the wrong place. "No country of the Far East offers so ungrateful a field, so infertile a soil, to apostolic endeavors. This is the characteristic note of the past, it will be, alas! also that of the near future." To the geographer, as a study in ethnological psychology, the book is in many ways interesting, but it should be made pre-

scribed reading for every prospective missionary, in order to teach him that the purest zeal and devotion lead only to a waste of precious energy as long as they are not tempered by knowledge, wisdom and discretion.

M. K. GENTHE.

AUSTRALIA

Australia in its Physiographic and Economic Aspects. By Griffith Taylor. The Oxford Geographies. Edited by A. J. Herbertson. 256 pp., maps and illustrations, and index. Clarendon Press, Oxford, 1911. 7½ x 5.

The book lays especial stress on the physical controls which govern the industrial conditions of the continent. Half of the work is given to a study of the physiographic aspects of Australia, with a special study of New South Wales. The remainder is devoted to detail accounts of the various industries. The whole work emphasizes the facts that the geological structure of the country controls its physical features and its mining industries, and that climatic conditions, as well as suitable soil determine what regions are barren, pastoral or agricultural. The book is abundantly illustrated with black and white maps, the topic is methodically treated, and the work is calculated to edify many readers outside of the school room.

EUROPE

Régions et Pays de France. Par Joseph Fevre, Professeur à l'École normale de Dijon, et Henri Hauser, Professeur à l'Université de Dijon. Avec 147 cartes et gravures dans le texte et 516 pp. Felix Alcan, Éditeur, Paris. 1909. Fr. 7.

One of the admirable geographical studies by French authors, which have been published within the past three or four years. It is a study of the physiography of France, and the land features of the entire country are discussed and illustrated in twelve chapters. There is little in the work that is original, but in method of presentation, in clearness of exposition, and in the adequacy and helpfulness of the illustrations it ranks among the best books of the kind that have recently appeared.

British Rainfall, 1908. By Dr. Hugh Robert Mill. Pp. 100 and 304, maps and illustrations. London, Stanford, 1909. 8vo.

The same, 1909. Pp. 120 and 308. London, Stanford, 1910.

The unique "British Rainfall Organization," under the able directorship of Dr. Mill, supplies meteorologists with an important annual volume on "British Rainfall." Although, as the title indicates, this volume relates only to the rainfall of the British Isles, those who take the pains to look through its pages will always find much of general interest. They will also find in it a deal of inspiration for undertaking the heavy task of collecting and reducing meteorological data, which is necessary before we can make any sound progress in our knowledge of the climatic conditions of the earth.

We may here call attention to the fact that the volume for 1908 contains articles by Dr. Mill on new recording rain-gauges, and a colored frontispiece map showing the relation of the rainfall of 1908, to the average of 1870-1899. There are also innovations in the discussion of the monthly rainfall, maps of the actual fall being given, together with those showing the percentage dif-

ference from the normal, as well as in the fuller treatment which has been accorded to the subject of heavy falls on rainfall days and in short periods. The volume for 1909 is the 49th of the series—surely a splendid record of important work well done. The whole unique collection of documents of the British Rainfall Organization, and Dr. Mill's interest in the concern, have been made over to a body of trustees, Dr. Mill continuing to act as Director. This body of trustees, which is strong and representative, has formed an endowment fund, so that the whole undertaking has been put on a firm and permanent basis. It appears, from the discussions in the volume for 1909, that the rainfall for 1909 was exactly the average, but that in the last 21 years dry years have been more than twice as frequent as wet ones. R. DEC. WARD.

The Classic Mediterranean. By John Bancroft Devins. 255 pp., map and illustrations. American Tract Society, New York, 1910. \$1. 8 x 6.

A readable collection of notes made on a journey in the central and eastern Mediterranean. The descriptions are somewhat disjointed and brief, since many regions were visited and the book is not large. The work of Protestant missionaries in Turkey and elsewhere is described. As a series of brief personal impressions, the book will commend itself to a considerable number of readers. F. V. EMERSON.

GENERAL

The Face of the Earth (Das Antlitz der Erde). By Eduard Suess. Translated by Hertha B. C. Sollas under the direction of W. J. Sollas. Vol. IV (=III ii of the German edition) viii + 673 pp. Clarendon Press, Oxford, 1909.

The favor done the English-speaking world by the Sollases in translating the first three volumes of Suess's monumental work on surface geology has been enhanced by the promptness with which the English version of the second part of the third volume of the work appeared after the publication of the German original. It is possible now for the reader or student familiar only with the English language to obtain easily a complete survey of the most comprehensive treatise in existence regarding the geological origin of the surface features of the entire globe. The plates belonging to the volume and an index to the complete work are to form Volume V of the English translation.

The present volume opens with a discussion of the extension of the Altaide mountain system from Asia westward across Europe, into eastern North America and southwestward into northern Africa. The description of the wide development of these pre-Permian mountains is impressive. The Altaides form the vast passively resistant foreland platform of three continents. The Alpides follow upon the Altaides and rest upon them as if they were a frame for their support. The Alpides comprise not only the Alps themselves, but also the mountain ranges east and west from the Black Sea to Gibraltar. They give expression to practically the whole of the contraction of the earth's mass that has occurred since Carboniferous time within a large portion of the globe.

In America, Laurentia is described as a very ancient mountain nucleus, behaving toward all the younger folds as a shield or foreland. Suess, however, extends Laurentia beyond the boundaries usually set by American geologists. He makes it reach from the Appalachians to the Rocky Mountains and to lat. 30° N. on the south. Greenland is a fragment of Laurentia, standing as a *horst* between subsidences of different ages. On the west, the long folded

ranges which border the Pacific coast of America, are joined on the northwest by the group of the Alaskides, while the Rocky mountain system is continued northward and reaches the Arctic Ocean north of Bering Strait as the Arctic branch of the Alaskides.

Passing thus from one feature of the earth's surface to another—true mountains, plateaus, valleys, ocean basins, volcanoes, islands—Suess by his marvelous and masterly marshaling of facts, bears the reader along irresistibly, until he almost sees the advance of one wave of mountain-making after another across the continents and oceans with all the attendant phenomena. The book is a perfect treasure house of collated observations and countless references.

One of the most interesting, illuminating and suggestive chapters is that devoted to "The Moon. Hypotheses. Retrospect." One of the important conclusions is negative, and is that the theory of isostasy is based upon inadequate observations. The more exact measurements of recent years lead to a grave doubt of the truth of there being a deficit in gravity beneath the mountains. A great service to science is the emphasis laid throughout the work upon the idea that the ocean, as well as the land, has varied in elevation, that is, in the distance of its surface from the center of the globe. Hence, Suess does not speak of subsidence and elevation of the land, but of positive and negative movements in the strand line, leaving the mind of the reader free from preconceived notions in the consideration of the phenomena under discussion.

As in the previous volumes of the series, the English translation follows the German idioms too closely for pureness of style, and sometimes even for lucidity of expression. Some new words are introduced which cannot be complained of, but the frequent use of established English words in new senses, and the transfer of German words almost bodily into English, are to be deprecated. Some carelessness in abbreviation of names of societies and publications may lead to trouble in finding references; for instance, we find the publication of the Geological Society of America constantly cited as *Bull. Am. Geol. Soc.*, and the *Bulletin of the American Museum of Natural History*, called *Am. Mus. N. Y.* These, however, are minor matters, and the English-speaking world is far the richer, in a geological and geographical sense, through being able now to read Suess in its own tongue.

E. O. HOVEY.

The Age of Mammals in Europe, Asia and North America. By Henry Fairfield Osborn. xvii and 635 pp., maps and illustrations, appendix and index. The Macmillan Company, New York, 1910. \$4.50.

This volume of 650 pages and over 200 illustrations brings together in compact form the results of many years of work by the author and his co-workers in the American Museum of Natural History in New York. No museum of the world has a wealth of material in Vertebrate Paleontology equal to that of the American Museum and upon this material, largely collected and prepared under his own direction, the author has drawn for the substance of his book. It is in the best sense a source book, for it gives at first hand, from the original material, the ideas of an acknowledged master in mammalian paleontology. Moreover, the text is the amplification of material prepared for lectures and tried out before students, so that it has the clarity and directness of style so welcome, and rare, in such a work.

The time has long passed when any man can call himself master of all phases of even such a seemingly narrow branch of science as Vertebrate Paleon-

tology, and those who are interested in other lines than that of the mammals will find great help and comfort in this successful effort to bring within reasonable compass the results of the latest work upon the mammals.

Abundant faunal lists and carefully prepared maps illustrate the facts of faunal migrations and the effect of changing climate and surface upon the development of the mammals from the earliest Tertiary to the Recent. Perhaps nowhere else have the ideas of Tertiary paleogeography and its effects on the interchange of faunas between the continents been so clearly brought out.

By no means the least attractive feature of the book, especially to those who are not familiar with the scattered literature of the subject, are the illustrations of the reconstructed skeletons and the restorations in the flesh of the extinct forms. The skilful work of the artist does not convey an idea of how much work and thought have been expended in the preparation of the restoration from fragmentary material. It is a source of regret that the half-tone plates do not do justice to the beauty of the original drawings or to the mounted skeletons.

One of the questions most frequently asked the collector and describer of vertebrate fossils is—"How do you find the things?" This is as well answered as anyone could by the numerous illustrations of the various camps occupied by the parties from the American Museum which show the character of the country in which the specimens are found.

Not the least valuable part of the book is the very complete classification of the Mammalia, recent and extinct, which occupies nearly fifty pages of the book and is largely the work of Drs. Gregory and Matthew of the American Museum. No less valuable is the bibliography of nearly forty pages.

In a work so comprehensive and full of detail it is always possible for some parts to be less satisfactory than others, and students of Pleistocene geology will hardly be content with the description of the glacial and interglacial stages on pages 442-445. The whole volume is handsome in appearance and readily handled. It is safe to say that the book will find its main usefulness among students of zoology and geology. It is not "science which reads like a novel" to attract even the serious leisure of a general reader, but it will remain for long a most valuable book for workers in Paleontology and related subjects.

E. C. CASE,
University of Michigan.

The Clipper Ship Era. An Epitome of Famous American and British Clipper Ships, Their Owners, Builders, Commanders and Crews, 1843-1869. By Arthur H. Clark. xii and 404 pp., illustrations and index. G. P. Putnam's Sons, New York, 1910. \$2.

A very interesting, descriptive volume dealing with the period of America's supremacy on the high seas from 1843 to 1869, when year after year the great ship owners endeavored to beat their own records in quick and profitable long sea voyages. First developed in reference to the China tea trade, the scene of greatest activity rapidly shifted first to the New York-California route after the discovery of gold in 1849, then later to the Australian route after the decline in California trade, and ended in 1869, with the opening of the Suez Canal, by which time steam had been made to outdo the wind as a motive power for freight vessels.

The author makes much use of technical terms like mizentopgallant masts, maintopsail yards, royalstuddingsails and other names once familiar to every

schoolboy, but now in little use except by a few sailors, and evidently fails to realize that nautical descriptions are not clear to everyone. Still the reader is kept constantly alert by the graphic descriptions and by the author's abounding enthusiasm, obviously based on a masterful knowledge of all that he describes. In fact, some of the passages are real literature and fine examples of narrative writing at its best.

He pays high tribute to the work of Lieutenant Maury in charting the seas, and shows how his Wind and Current Charts and Sailing Directions helped the skilful navigators in cutting time from their long voyages—the greatest ambition of every sailing master in these days of rivalry when the tension was constantly at the breaking point for 86-100 days in the long runs from New York to San Francisco.

Historically the volume is valuable as summarizing the causes and the consequences of the clipper ship trade, and as putting in concise and agreeable form much valuable material that has hitherto remained relatively inaccessible. Authoritative in content, sympathetic in form presented, clearly and appealingly written, the volume deserves to be read for pleasure and profit by all those who wish or need to know about American commerce in the middle of the last century.

R. E. DODGE.

History of Anthropology. By Alfred C. Haddon, M.A., Sc.D. With the Help of A. Hingston Quiggin, M.A. xix and 206 pp., illustrations and index. G. P. Putnam's Sons, New York, 1910. 6½ x 4.

Dr. Haddon, university reader in Ethnology, Cambridge, is an authority on anthropology. In this book he presents the best information relating to his subject matter. Under the head of "Physical Anthropology," he tells of the pioneer workers in this field, of the scholars who systematized the study, of the controversies to which it gave rise, of the gradual unfolding of the antiquity of man, race description and classification, and the methods and aims of psychology. These six chapters fill a little more than half of the volume. The remainder is given to "Cultural Anthropology," discusses the scope and sources of ethnology, the history of archaeological discovery, technology, sociology and religion, linguistics, and classification and influence of environment. A concise, but comprehensive bibliography and index of authors complete this useful work.

The Nations of the Modern World. An Elementary Study in Geography. By H. J. Mackinder, M.A. xvi and 319 pp., maps and illustrations. George Philip & Son, London, 1911. 7½ x 5.

This is the fourth and last volume of Mackinder's Geographical Studies. The book is written from an historical standpoint, and is divided into five parts based upon historical crises in the history of Great Britain. Part I, "The Narrow Seas," treats of lands of the English, French, Dutch, North Germans and other peoples, colonizers and natives, as have a place in history previous to 1800. Part II, "Europe," deals with the growth of Europe following the victory of Trafalgar. Part III, "The Oceans," has for its thread the control of the ocean by the English. Part IV, "The World," discusses the nations which, through commercial competition, have established a place for themselves on the seas and share with England the primacy upon the ocean. Part V, "The British Empire," is based upon an Empire united by the commercial advances of her competitors. The book is well illustrated and is rich in maps.

R. M. BROWN.

Persia and Its People. By Ella C. Sykes. xi and 356 pp., map, illustrations and index. The Macmillan Co., New York, 1910. \$2.50.

The author's visits to Persia extended over three years, during which she had considerable opportunity to mingle with the inhabitants and to study their ways. Her book is a conscientious effort to give a truthful picture of Persia, with particular emphasis upon those aspects that are likely most to interest the general reader.

The book opens with a short description of the country, gives a bird's-eye view of its history, tells of the Shah, his capital and the government, describes Meshed, which is not only a center of pilgrimage but also a typical Persian city, gives chapters to the religions of the country, the Persian man and woman, the sacred month of Muharren, the aspects of travel, country life, the Persian Gulf and Karun River, fauna and flora, Marco Polo's journey through Persia, antiquities, sports and amusements, Persian sports, arts and crafts, superstitions and medicines. A good idea of Persia from the standpoint of the general reader may be gained from this well-written and well-illustrated volume.

Heaton's Annual. The Commercial Handbook of Canada and Boards of Trade Register. Sixth Year. 1910. Edited by Ernest Heaton, B.A., and J. Beverly Robinson. 454 pp., maps and index. Heaton's Agency, Toronto, 1910. \$1. 7 x 5.

Contains a large amount of classified information relating to the government, post office, banks, commerce, transportation, agriculture, resources, etc., of the Dominion. A conspicuous feature is a description of towns and local opportunities filling fifty-seven pages. A valuable list of government and railroad publications on pp. 267-269.

NEW MAPS

EDITED BY THE ASSISTANT EDITOR

MAPS ISSUED BY UNITED STATES GOVERNMENT BUREAUS

U. S. GEOLOGICAL SURVEY

TOPOGRAPHIC SHEETS:

Colorado: Uncompahgre Quadrangle. 1:125,000 (1.97 mile to an inch). Contour interval 100 ft. ($38^{\circ}30' - 38^{\circ}00' \text{ N.}; 107^{\circ}30' - 107^{\circ}00' \text{ W.}$). [As on various sheets recently issued by the Survey certain names (on this sheet those of the National Forests) have been printed from type, and not engraved. Whatever the justification in economy of time, this change is greatly to be deplored, as it is hardly in keeping with the high artistic excellence of the maps published by the Survey.]

Ohio: Antrim Quad. 1:62,500 (0.99 mile to an inch). Interval 20 ft. ($40^{\circ}15' - 40^{\circ}00' \text{ N.}; 81^{\circ}30' - 81^{\circ}15' \text{ W.}$).

IDAHO. Geologic Map of the Sulphur-Bearing Area near Soda Springs, Idaho. [1:200,000 approx. (about 3.2 miles to an inch).] Black. Accompanies *Bull. U. S. Geol. Surv.*, 470-J, p. 4, 1911.

MISSOURI. Geologic Map of the St. Louis Quadrangle, Mo.-Ill. 1:62,500 (0.99 mile to an inch). ($38^{\circ}45' - 38^{\circ}40' \text{ N.}; 90^{\circ}30' - 90^{\circ}00' \text{ W.}$). Geology by

J. C. Jones, assisting N. M. Fenneman. Surveyed in 1906 in coöperation with the Geol. Surv. of Illinois. Plate 1, *Bull.* 438, U. S. Geol. Surv., 1911. 13 colors. [Geology superimposed on topographic map (relief in contours; interval 20 ft.). Distinguishes between Quaternary (3 subdivisions), Tertiary (1) and Carboniferous (5).]

U. S. COAST AND GEODETIC SURVEY

Nantucket Shoals. 1:80,000 (1.26 mile to an inch). ($41^{\circ}28'$ - $40^{\circ}42'$ N.; $70^{\circ}4'$ - $69^{\circ}17'$ W.) Chart No. 213. March 1911. Price 50 cts.

Fire Island Beach to Rockaway Beach, N. Y. 1:80,000. Chart No. 119. Feb. 1911. 50 cts. [Coast of Long Island from Rockaway Beach ($73^{\circ}50'$ W.) to eastern end of Great South Bay ($72^{\circ}52'$ W.).]

Hempstead Harbor, Long Island, N. Y. 1:20,000 (0.32 mile to an inch). ($40^{\circ}53.6'$ - $40^{\circ}48.0'$ N.; $73^{\circ}43.2'$ - $73^{\circ}38.3'$ W.) Chart No. 366. April 1911. 20 cts. [Shore topography in contours; interval 20 ft.]

Delaware River. Penns Neck to Philadelphia. 1:80,000. ($39^{\circ}34'$ - $40^{\circ}0'$ N.) With inset: Bridesburg to Trenton (Delaware R. from $40^{\circ}0'$ - $40^{\circ}13'$ N. 1:80,000). Chart No. 126. March 1911. 50 cts.

Rappahannock River. Tolls Point to Marsh Point. Chesapeake Bay, Virginia. 1:40,000 (0.63 mile to an inch). ($37^{\circ}57.7'$ - $37^{\circ}36.0'$ N.) From Tolls Point to Tappahannock on main map; from Tappahannock to Marsh Point ($37^{\circ}55.8'$ - $38^{\circ}10.0'$ N.) on inset. Chart No. 535. March 1911. 50 cts.

St. Andrew Sound, Georgia. 1:40,000. ($31^{\circ}4.2'$ - $30^{\circ}51.6'$ N.; $81^{\circ}34'$ - $81^{\circ}16'$ W.) Chart No. 448. March 1911. 25 cts.

Fernandina Entrance, Florida. 1:20,000. ($30^{\circ}45.0'$ - $30^{\circ}38.4'$ N.; $81^{\circ}30.5'$ - $81^{\circ}21.2'$ W.) Chart No. 453. March 1911. 25 cts.

Fernandina to Jacksonville, Florida. 1:40,000. ($30^{\circ}40.2'$ - $30^{\circ}18.2'$ N.; $81^{\circ}40.8'$ - $80^{\circ}20.5'$ W.) Chart No. 577. April 1911. 50 cts.

St. Johns River, Florida, from Jacksonville to Hibernia. 1:40,000. ($30^{\circ}20'$ - $30^{\circ}3'$ N.) Chart No. 455b. April 1911. 40 cts.

Key West Harbor and Approaches, Florida. 1:30,000 (0.47 mi'e to an inch). ($24^{\circ}38.1'$ - $24^{\circ}26.2'$ N.; $82^{\circ}1.0'$ - $81^{\circ}42.5'$ W.) Chart No. 584. March 1911. 50 cts.

Main Entrance to Charlotte Harbor, Florida. 1:40,000. ($26^{\circ}50'$ - $26^{\circ}38'$ N.; $82^{\circ}22'$ - $82^{\circ}7'$ W.) Chart No. 474. April 1911.

Mayaguez Bay and Approaches, Porto Rico, West Indies. 1:15,000 (0.23 mile to an inch). ($18^{\circ}16.4'$ - $18^{\circ}9.4'$ N.; $67^{\circ}14.0'$ - $67^{\circ}7.4'$ W.) Chart No. 931. April 1911. 50 cts.

Cape St. Elias to Shumagin Islands, Alaska. Mercator projection. [Equatorial scale 1:1,825,000 approx.] ($61^{\circ}35'$ - $54^{\circ}30'$ N.; $159^{\circ}20'$ - $140^{\circ}10'$ E.) Chart No. 8502. March 1911. 50 cts.

Alaska Peninsula and Aleutian Islands to Seguam Pass. [Mercator projection: equatorial scale 1:1,825,000 approx.] ($59^{\circ}10'$ - $51^{\circ}30'$ N.; $173^{\circ}20'$ - $156^{\circ}30'$ E.) Chart No. 8802. April 1911. 50 cts.

Bering Sea, Eastern Part. [Mercator projection: equatorial scale 1:3,050,000 approx.] ($66^{\circ}10'$ - $53^{\circ}20'$ N.; 176° - 156° E.) Chart No. 9302. April 1911. 50 cts.

General Sailing Chart of the Northwest Coast of America from San Francisco to Bering Sea. Polyconic projection. 1:3,600,000 (56.82 miles to an inch). Sailing Chart S. 50 cts. [Includes Pacific Coast from San Francisco to Kuskokwim Bay, showing Aleutian Islands as far as the Islands of the Four Mountains (170° W.).]

Albay Gulf and Part of Lagonoy Gulf, East Coast of Luzon, Philippine Islands. 1:100,000 (1.58 miles to an inch). ($13^{\circ}37'$ - $13^{\circ}0'$ N.; $123^{\circ}30'$ - $124^{\circ}26'$ E.) Chart No. 4221. April 1911. 50 cts. [Topography partly in contours; interval 200 ft.]

Sulu Archipelago, Philippine Islands. 1:400,000 (6.31 miles to an inch). ($7^{\circ}5'$ - $4^{\circ}23'$ N.; $118^{\circ}31'$ - $122^{\circ}20'$ E.) Chart No. 4722. April 1911. 50 cts.

U. S. HYDROGRAPHIC OFFICE

[Monthly] Pilot Chart of the North Atlantic Ocean. [Mercator projection: equatorial scale 1:15,900,000.] (60° N. - 0° ; 100° W. - 10° E.) June 1911.

On reverse: Some Model Experiments on Suction of Vessels by Naval Constructor E. W. Taylor, U. S. N.

WEATHER BUREAU

[Five maps of the United States (1:12,300,000 approx. [about 194 miles to an inch]) showing] (I) The Average Date of the Last Killing Frost in Spring; (II) The Average Date of the First Killing Frost in Autumn; (III) The Latest Date on which a Killing Frost has Occurred in Spring; (IV) The Earliest Date on which a Killing Frost has occurred in Autumn; (V) The Average Length of the Crop-Growing Season [in] Days. Accompany "Frost Data of the United States," by P. C. Day. Weather Bureau, *Bull.* V, Washington, 1911. [Lines of equal date only in territory E. of the Cordillera; in the Cordilleran Region the dates themselves are printed at the corresponding places. On Maps I and II the interval is 5 or 6 days; on maps III and IV, 10 to 11 days. Map V has been compiled from other data than the previous maps and therefore does not completely tally with them, although the average length of the crop season in days is taken to be the interval between the average date of the last killing frost in spring and that of the first killing frost in autumn. For comment on text see p. 523.]

BIOLOGICAL SURVEY

NORTH AMERICA. [Map of North America showing] Distribution of the Muskrats as Known at Present. [1:36,550,000 approx. (about 57.6 miles to an inch).] 14 colors. Accompanies "A Systematic Synopsis of the Muskrats," by N. Hollister (North American Fauna, No. 32), Biol. Surv., Washington, 1911. [Shows the habitat of the muskrat, which includes the greater part of North America, from the northern limit of trees south to the Mexican border. The muskrat is not found along the lower Atlantic seaboard nor, excepting southern Louisiana, over the entire Gulf Region nor on the Pacific Slope south of central Oregon. Distinguishes between 14 species.]

NORTH AMERICA

CANADA. Standard Topographical Map. Sheet 39. Ontario: Mattagami Sheet. Algoma, Sudbury and Nipissing Districts. 1:500,000 (7.89 miles to an inch). (51°-48° N.; 83°-80° W.) 3 colors. Dept. of the Interior, Ottawa.

ILLINOIS. Map of Illinois showing oil-fields, cross-section lines, position of structural terraces, and of the La Salle anticline. 1 color. [1:3,600,000 approx. (about 57 miles to an inch).] Accompanies paper on "Oil Investigations in Illinois," by R. S. Blatchley, *Journ. W. Soc. Eng.*, Chicago, Vol. 16, facing p. 370, May 1911.

NEW YORK. [Geologic map of] Poughkeepsie Quadrangle. 1:62,500 (0.99 mile to an inch). (41°45'-41°30' N.; 74°0'-73°45' W.) 9 colors. Accompanies "Geology of the Poughkeepsie Quadrangle," by C. E. Gordon, *N. Y. State Mus. Bull.* 148, Albany, 1911. [Geology superimposed on topographic sheet of U. S. Geol. Surv. Contour interval 20 ft. Distinguishes between (1) Pre-Cambrian [sic], (2) Cambrian, (3) Cambrian and Ordovician, (4) Ordovician. Shows faults and important outcrops.]

UNITED STATES. (a) [Twelve maps of the United States showing mean cloudiness for each month. 1:120,000,000 (about 1894 miles to an inch).] Black. (b) [Map of the United States showing] mean annual cloudiness [1:92,500,000 (about 1459 miles to an inch)]. Black. Accompany paper on same subject by K. McR. Clark, *Quart. Journ. Roy. Meteor. Soc.*, Vol. 37, pp. 170-174, April, 1911.

CENTRAL AMERICA

SALVADOR. The Balsam Coast of Salvador. [1:1,388,000 approx. (about 61.5 miles to an inch).] 13°55'-13°10' N.; 89°50'-88°50' W. Black. Accompanies article on "Balsam of Peru," by A. Hale, *Bull. Pan-Am. Union*, 1911, pp. 881-891. [Shows area occupied by the balsam tree (*myrospermum salvadorensis*), emphasizing area of greatest production.]

SOUTH AMERICA

BRAZIL. [Three climatologic maps of the State of São Paulo, entitled] *Mappa Climatologica*: (1) Janeiro de 1909, (2) Julho de 1909, (3) Anno de 1909. 1:3,000,000 (47.34 miles to an inch). (20° - 25° S.; $53^{\circ}10'$ - $43^{\circ}10'$ W.) 2 colors. Accompany "Dados Climatologicos do Anno de 1909," by J. N. Belfort Mattos, Serie 11, Nos. 12, 13, 14 and 15, Secr. da Agric., Comm. e Obr. Publ. do Estado de São Paulo, Direct. da Agric., Seccão Meteorolog., S. Paulo, 1910. [Isotherms in dotted, isobars in full, red lines; six degrees of precipitation indicated; symbols for nebulosity and wind.]

PERU. Mapa del Departamento de Loreto corregido y aumentado con los estudios de los Srs. Espinar, Buenaño, Mavila, Zavala, Donayre, von Hassel y otros. Mandado verificar por el Señor Prefecto Coronel Don Pedro Portillo en los años de 1901 á 1904. Trazo y dibujo de los cartografos Hoempler, Baluarte y Vallejos. 1:1,000,000 (15.78 miles to an inch). ($1\frac{1}{3}^{\circ}$ N. - 7° S.; 79° - $62\frac{1}{2}^{\circ}$ W.) 1906. 3 sheets, constituting northern half of this map. 4 colors. With "Itinerario de Viajes en el Norte del Departamento de Loreto (Cuadro de Distancias Calculadas en Horas de Navegacion)." Accompanies *Boll. de la Soc. Geogr. de Lima*, Año 18, Tomo 23, Trim. Segundo. June 30, 1909. [The southern half of this map is to be found in Año 18, Tomo 23, Trim. Cuarto of the same publication. Drainage, linear, in black, areal, in blue, relief in sketchy rudimentary shading in brown, forest areas roughly indicated in green, boundaries in red and black. Valuable because of its large scale, but poor in execution. Covers the territory of the upper Amazon System. Includes the whole Atlantic slope of Ecuador and part of southern Colombia in Peruvian territory.]

PERU. Departamento de Cajamarca. Ampliación de la Carta de la Sociedad Geográfica de Lima por el ingeniero Fermin Malaga Santolalla. Trazo y dibujo del Cartógrafo, Camilo Vallejos Z. 1:500,000 (7.89 miles to an inch). ($4^{\circ}30'$ - $7^{\circ}50'$ S.; $79\frac{3}{4}^{\circ}$ - $77\frac{3}{4}^{\circ}$ W.) 7 colors. Accompanies monograph on this *departamento* by Fermin Malaga Santolalla in *Bol. de la Soc. Geogr. de Lima*, Año 16, Tomo 20, 1906. [Drainage in black, relief in rudimentary brown shading. The political subdivisions of the departamento (provincias) distinguished by areal coloring.]

AFRICA

ALGERIA. Les Mines de Zinc, de Plomb et de Cuivre en Algérie, d'après M. Dussert. 1:4,500,000 (71.02 miles to an inch). Black. Accompanies paper with similar title by P. Lemoine in *La Géogr.*, Vol. 23 (1911), p. 265.

ALGERIA-TUNIS. Algérie-Tunisie- 50,000e. État d'avancement des travaux au 31 décembre 1909. Tableau d'assemblage des Cartes d'Algérie et de Tunisie au 50,000e et au 200,000e. [1:3,133,000 approx. (about 49.5 miles to an inch).] *Pet. Mitt.*, Vol. 57, I (1911), Taf. 50. [Index map. Originally published as Planche X of Report of Service Géographique de l'Armée for 1909. Cf. also note under France.]

ANGOLA. Das portugiesische Grenzgebiet gegen Deutsch-Südwestafrika zum Verfolg der militärischen Operationen im Distrikt Huilla. Nach einem portugiesischen Original des Hauptmanns João d'Almeida. 1:4,500,000 (71.02 miles to an inch). (14° - 18° S.; 12° - 23° E.) 2 colors. *Pet. Mitt.*, Vol. 57, I, (1911), Taf. 40. [Shows location of forts.]

BELGIAN CONGO AND GERMAN EAST AFRICA. Die neue Grenze zwischen Belgisch-Kongo u. Deutsch Ost-Afrika nach dem Vertrage vom 11. August 1910. 1:750,000 (11.84 miles to an inch). ($0^{\circ}40'$ - $3^{\circ}30'$ S.; $28^{\circ}33'$ - $30^{\circ}28'$ E.) 6 colors. Accompanies, as Taf. 6, notice with similar title by H. Wichmann, *Pet. Mitt.*, Vol. 57, I, (1911), p. 246. [Shows the final delimitation between Belgian and German territory in the vicinity of Lake Kivu, as well as four former tentative boundaries.]

GERMAN EAST AFRICA. (1) Das Hochland der Riesenkrater und die südlich anschliessenden Gegenden bis zum Hanang auf Grund eigener Aufnahmen und

mit Benutzung der Aufnahmen von Abel, Bast, Baumann, Glauning, Graf v. Götzen, Hoesemann, Kannenberg, Kohlschütter, Lademann, Methner, Reitzenstein, Schlobach, Sperling, Uhlig u. Uhlig's Karte der Ostafrikanischen Bruchstufe. Bearbeitet von Fritz Jaeger; konstruiert u. gezeichnet von W. Rux in dem von P. Sprigade u. M. Moisel geleiteten kartograph. Institut von Dietrich Reimer. 1:150,000 (2.36 miles to an inch). ($2^{\circ}50' - 4^{\circ}2' \text{ S.}$; $35^{\circ}2' - 35^{\circ}58' \text{ E.}$, except for S.W. corner of map, which is an inset covering the territory adjoining that of the main map on the south and bounded by $4^{\circ}2' - 4^{\circ}33' \text{ S.}$; $35^{\circ}16' - 35^{\circ}37' \text{ E.}$) 5 colors. (2) Das abflusslose Rumpfschollenland zwischen Iramba, Njarasasee, Umbugwe und Ufiome. Auf Grund trigonometr. Aufnahmen von F. Jaeger und Wegeaufnahmen von Baumann, Dantz, Glauning, Graf v. Götzen, Hoesemann, Jaeger, Kannenberg, Kohlschütter, Lademann, Methner, v. Prittwitz, Schlobach, Seyfried, Sperling, Stadlbauer, Stuhlmann, Uhlig und anderen bearbeitet von F. Jaeger und W. Rux in dem von P. Sprigade u. M. Moisel geleiteten kartogr. Institut von Dietrich Reimer. 1:300,000 (4.73 miles to an inch). ($3^{\circ}27' - 4^{\circ}34' \text{ S.}$; $34^{\circ} - 36^{\circ} \text{ E.}$) 5 colors. (3) Skizze der Hamitischen Sprachgebiete in Aequatorial-Ostafrika. Entworfen und gezeichnet von Bernhard Struck. 1:5,000,000 (78.90 miles to an inch). $20^{\circ}30' \text{ N.} - 6^{\circ}30' \text{ S.}$; $33^{\circ}20' - 40^{\circ}40' \text{ E.}$) 5 colors. Accompany, as Karten 1, 2 and 3, "Das Hochland der Riesenkrater und die umliegenden Hochländer Deutsch-Ostafrikas, Teil I" by Dr. Fritz Jaeger, *Mitt. aus den Deutschen Schutzgeb.*, Erghft. No. 4, Berlin, 1911. [On maps 1 and 2 relief is in approximate contours in brown, distinction is made between periodic and constant streams, vegetational boundaries are indicated, cultivated and inhabited areas are shown in green, Jaeger's route in red and that of other travelers in black, trigonometric stations in black and red. These two maps represent the result of the highest type of exploratory surveying. The execution is of the best. The third map divides the territory into the following linguistic areas: (A) Hamitic: I Lower Hamitic; II Niloto-Hamitic: (a) Bari-Masai, (b) Nandi-Tatoga; (B) Bantu; (C) Sudanese; (D) Linguistic Enclaves.]

GERMAN SOUTHWEST AFRICA. Skizze des Weges Otjivarongo-Waterberg. Mit Benützung von Görgen's Besitzstandkarte von Südwest-Afrika. 1:400,000 (6.31 miles to an inch). ($20^{\circ}10' - 20^{\circ}45' \text{ S.}$; $16^{\circ}37.5' - 17^{\circ}37.5' \text{ E.}$) Black. Accompanies, as Taf. 2, "Reisestudien aus Südwest-Afrika," by E. Moritz, *Ztschrft. Gesell. Erdk.*, Berlin, 1911, pp. 213-252.

ASIA

ASIA MINOR. Topographische Karte des Westlichen Kleinasien nach eigenen Aufnahmen auf Reisen, die mit Mitteln des Kais. Deutschen Archäologischen Instituts im Jahre 1900, der Hermann und Elise geb. Heckmann Wentzel Stiftung in den Jahren 1901, 1902 und 1904 ausgeführt sind, entworfen von Dr. Alfred Philippson, ord. Professor der Geographie an der Universität Halle a. S. Herausgegeben mit Unterstützung der Hermann und Elise geb. Heckmann Wentzel Stiftung. Massstab 1:300,000 [47.34 miles to an inch]. 6 Blatt. Preis 24 Mark. Erscheint in 3 Lieferungen (je 2 Blatt) zum Preise von je 8 Mark. Einzelne Blätter 5 Mark. Erste Lieferung (Blatt 1 und 3). Gotha: Justus Perthes.

These two sheets are the first to be published of a topographic map of western Asia Minor by Professor Philippson. It will be bounded approximately by the meridians of 26° and $30^{\circ}20' \text{ E.}$, and by the parallels of $40^{\circ}30' \text{ and } 35^{\circ}50' \text{ N.}$, and will comprise six sheets in all, two in longitude and three in latitude. The two sheets published (Nos. 1 and 3) are the northern and middle ones of the western half of the map; they include the Troad, western Mysia and Lydia.

This map is the result of personal explorations by Prof. Philippson, extending from 1900 to 1904, which had as their aim the comprehensive treatment of the eastern part of the geographic unit which the borderlands of the Ægean constitute, both physiographically and culturally, for which Philippson has suggested the name of the Ægeid and of the western part of which he has given us so splendid an account in his "Der Peloponnes." The name of the author of the map is sufficient to indicate its high quality. It is representative of the work of men of the type of von Richthofen and his followers—men whose train-

ing is so thorough that they are as equal to exploration in the field as to investigation in the study and whose broadness of mind impels them to generalization and synthesis and will not admit of a partial treatment of the subject. It is to men of this type that we owe the new geography.

The special value of the map lies in the interpretation of the relief of the land by a trained investigator, based on his personal observations. In its preparation the ideal requirement of the geologically trained topographer has been fulfilled. In this, aside from its recentness, lies the chief merit of Philippson's map in contradistinction to its noteworthy predecessors, Heinrich Kiepert's *Karte vom westlichen Kleinasien*, 1:250,000 (in 15 sheets, 1890-92), and his son Richard Kiepert's *Karte von Kleinasien*, 1:400,000 (in 24 sheets, 1901-1908), both of which, however admirable, were mainly compilations.

The execution of the map is in keeping with the high quality of its content. Relief (except of the regions not visited by the author: the Troad, mainly) is in sketch contours, with an interval of 100 meters, supplemented by shading; drainage, coast line and sea (with isobaths of 50 meter interval) in blue; modern culture and nomenclature in black; ancient culture and nomenclature, and the author's route in red.

The topographic map is the basis of a geologic edition entitled "*Geologische Karte des westlichen Kleinasien*, 1:300,000, entworfen von A. Philippson," of which Sheet No. 1, corresponding to the same sheet of the topographic edition, accompanies the first number (*Erg.-Heft No. 167*, 1910) of "*Reisen und Forschungen im westlichen Kleinasien von A. Philippson*," to be published serially as *Ergänzungshefte to Petermanns Mitteilungen*.

ASSYRIA AND BABYLONIA. *Carte des Principales Fouilles de Babylonie, Assyrie et Elam*. [1:5,000,000 approx. (about 79 miles to an inch).] 40°-29° N.; 40½°-49° W.). Black. *L'Asie Franc.*, 11ème Année, p. 155, April, 1911. [Sketch map showing sites of principal archeologic excavations.]

CAUCASUS. *Karta Kislovodsk i yevo Okrestnostiei* (Map of Kislovodsk and Environs). 1:420,000 (6.63 miles to an inch). (44°8'-43°24' N.; 42°8'-43°28' E.) Topogr. Sect. of the Gen. Staff, War Office. Edited by V. A. Merkuloff, 1910. 1 color. Accompanies paper, in Russian, on "The Climate of Kislovodsk in Winter in Comparison with that of other Climatic Stations," by A. Voeikov. *Zapiski Krynsko-Kavkaskavo Gornavo Kluba* (Bull. du Club Alpin de Crimée et du Caucase), No. 4, 1910, pp. 227-259, Odessa, 1911. [Relief in brown hachures. Kislovodsk is a winter-resort on the northern slope of the Caucasus, near Pyatigorsk. Dotted line encloses the basin of the upper Podkumok River.]

CELEBES. *Reizen door Centraal-Celebes van den mijn-ingenieur E. C. Abendanon en den opnemer W. Schiebel*, Maart-Juni 1910. 1:500,000 (7.89 miles to an inch.) (0°37'-3°0' S.; 119°15'-121°15' E.) With inset map "Schetskaart van de Landengte tusschen de Golf van Tomini en de Tomori-Baai (van Tambajoli naar Oewe Koeli)." 1:400,000 (6.31 miles to an inch). 3 colors. Accompanies, as Kaart No. IX, *Tijd. Kon. Ned. Aardr. Gen.*, Deel 28 (1911), No. 3, May 15, 1911. (Description in Deel 27, pp. 979 and 1219, and Deel 28, p. 73.) [Relief on main map in sketch hachures, lowlands in green, water blue; relief on inset map in sketch contours, interval 160 meters.]

CELEBES. *Zentral-Celebes. Reisen der Expedition der kgl. Niederländischen Geograph. Gesellschaft in den Jahren 1909 u. 1910. Ausgeführt von E. C. Abendanon*. 1:1,000,000 (15.78 miles to an inch). (3½°-4° S.; 118½°-122° E.) 4 colors. Accompanies, as Taf. 43, paper with similar title by same author, *Pet. Mitt.*, Vol. 57, I, (1911), pp. 234-238. [Based on the above map of the Royal Dutch Geogr. Soc., but extended on the E. and S. Relief in brown shading, route in red, desiccated lakes in green.]

CHINA. (a) [Nine Charts showing] Position and Kind of Lights on the Coast and Rivers of China. [Mercator projection: equatorial scale, except of Plan V, about 1:1,265,000]. Plan I (Hainan Strait); Plan II (Coast from Macao to Swatow); Plan III (Coast from Amoy to Wenchow); Plan IV (Coast from Wenchow to Woosung); Plan V (Approach to Woosung, equatorial scale 1:300,000 approx.); Plan VI (Kiaochow); Plan VII (Shantung Peninsula);

Plan VIII (Gulf of Pechili); Plan IX (Gulf of Liaotung). 5 colors. (b) Reference Plan [showing location of the nine charts]. [Mercator projection: equatorial scale 1:2,056,000 approx.] 4 colors. Accompany "List of Lighthouses, Light-Vessels, Buoys and Beacons on the Coast and Rivers of China, corrected to Dec. 1, 1910." Imperial Maritime Customs, III, Miscellaneous Series: No. 6, Shanghai, 1911. [Plans I to IX by symbols distinguish between the following kinds of lights: fixed white, fixed red, flashing white, group flashing white, flashing red and white, fixed white varied by flashes, fixed white varied by red flashes, occulting white, group occulting white, lightning flashes, group lightning flashes. Land in gray, water in blue, symbols for lights in yellow, red, black and white.]

CHINA. [Map of Chinese portion of railroad from Hanoi, Tonkin, to Yun-nan Fu, Yun-nan Province. 1:1,670,000 approx. (about 26.3 miles to an inch).] Black. *L'Asie Franc.*, 11ème Année, p. 189, April, 1911.

CHINA. A Map of China prepared for the China Inland Mission. 1:600,000 (94.68 miles to an inch). (42°-18° N.; 96°-128° E.) 7 colors. London: Published by the China Inland Mission, 1911. Mounted on cloth and folded. [China Inland Mission Stations with resident missionary are underlined in red. In Manchuria, where the C. I. M. has no work, the stations of the Scotch and Irish Presbyterian and Danish Lutheran Missions have been underlined.]

CHINA. Itinéraire au Tibet Oriental par Jacques Bacot 1909-1910. 1:500,000 (5.89 miles to an inch). 4 colors. 6 maps. Accompany paper with similar title by same author, as Plates 2-7, *La Géogr.*, Vol. 23, No. 4, April, 1911. [Embrace western parts of the provinces of Se-Chuan and Yunnan between 28° and 31½° N., and not of eastern Tibet, as title indicates. Add substantially to our insufficient knowledge of the region where the upper courses of the Yangtse, Mekong and Salween most approach each other. Relief in brown sketch contours, vegetation (pasture, forest and brush land) in green, route in red.]

DUTCH NEW GUINEA. De Mamberamo-Rivier. 1:1,000,000 (15.78 miles to an inch). (1°15'-3°45' S.; 137°20'-138°45' E.) Black. Accompanies, as Kaart No. VIII, paper on "De Wetenschappelijke Uitkomsten der Mamberamo-Expeditie 1909-10." *Tijd. Kon. Ned. Aardr. Gen.*, Deel 28 (1911), pp. 448-461. [Important map of the hitherto unknown territory drained by this river of northern Dutch New Guinea.]

FORMOSA. Carte Éthnographique de Formose. [1:2,415,000 approx. (about 38.1 miles to an inch).] 10 colors. Accompanies "Les Aborigènes de Formose," by R. Torii, *Journ. Coll. Science*, Univ. of Tokyo, Vol. 38, Art. 6, Plate 1.

INDIA. Explorations in the Eastern Karakoram by T. G. Longstaff, 1909. 1:500,000 (7.89 miles to an inch). (35°40'-34°33' N.; 77°40'-78°18' E.) 4 colors. With two inset maps: (1) [showing territory between 36½°-34¼° N.; 75½°-78½° E., 1:2,000,000 (31.6 miles to an inch)]; (2) [map of northern India, showing location of general map, 1:30,000,000.] Accompanies paper on "The Saltoro Pass," by T. G. Longstaff, *Alpine Journ.*, Vol. 25, (1911) pp. 485-488. Published by permission of the Royal Geogr. Soc. (duplicate of map published in *Geogr. Journ.*, Vol. 35, p. 744. Cf. *Bull.*, Vol. 42, (1910) p. 876). [Relief on the large-scale map in brown shading, névé in blue shading, glaciers in blue contouring. Distinction made between altitudes determined by the Survey of India and by Dr. Longstaff. The routes of Dr. Longstaff, Sir Younghusband and Dr. Neve separately shown in red. Inset map 1 shows no relief, only drainage and the outlines of glaciers. It shows the routes of Longstaff, 1909; Younghusband, 1887 and 1889; Hayward, 1868, and indicates position of main divide of the eastern Karakoram as heretofore incorrectly assumed. The divide lies farther north, as the Siachen Glacier proved to belong to the drainage system of the Indus.]

JAPAN. [Seven maps of Japanese lakes, viz.:] Map of Lake Biwa, with isobathymetric lines after Mr. Maeda [1:200,000, or 3.16 miles to an inch]. Map of Hakoné Lake, with isobathymetric lines [1:20,000, or 0.32 mile to an inch]; Map of Yamanaka Lake, with isobathymetric lines [1:20,000]; Map of Kawaguchi Lake, with isobathymetric lines [1:20,000]; Map of Hamana Lake, with isobathymetric lines [1:66,667, or 1.05 mile to an inch]; Map of Toya

Lake, with isobathymetric lines drawn by the Naval Hydrographic Office [1:47,700, or 0.75 mile to an inch]; Map of Chūzenji Lake, with isobathymetric lines after Viscount Tanaka [1:19,360, or 0.31 mile to an inch]. All maps black. Accompany, as Plates 6, 8, 10, 12, 14, 16 and 18, "Seiches in Some Lakes of Japan," by S. Nakamura and K. Honda. *Journ. Coll. Science, Univ. Tokyo*, Vol. 28, Art. 5, March 1911.

EUROPE

ADRIATIC SEA. Temperatur der Meeresoberfläche und der Luft [des Adriatischen Meeres], 27. Febr. bis 7. März, 1911. [1:6,386,000 approx., or about 100.8 miles to an inch]. Black. Accompanies "Vorläufiger Bericht über die erste Kreuzungsfahrt S. M. S. *Najade* in der Hochsee der Adria," by Prof. Dr. E. Brückner. *Mitt. der k.k. Geogr. Gesell.*, Wien, Vol. 54, p. 213, 1911.

BALKAN PENINSULA. L'Église Catholique dans les Balkans. 1:1,500,000 (23.67 miles to an inch). ($48\frac{1}{3}^{\circ}$ - 37° N.; 17° - 30° E.) Dessiné et gravé par R. Hausermann, Paris. Supplément au Journal "Les Missions Catholiques," 1911. 4 colors. [Shows, on a base map with relief in brown shading and drainage in blue, boundaries of the ecclesiastical divisions in red, and indicates seat of archbishoprics, bishoprics and secondary stations. The relief on this map is a good example of the best type of work of the hill-shading method.]

BRITISH ISLES. Mean Annual Rainfall. The British Isles. By Dr. H. R. Mill. Oxford Wall Maps. 1:1,000,000 (15.78 miles to an inch). (61° - $48\frac{1}{2}^{\circ}$ N.; 10° W. - 2° E.) Compiled 1908. 5 colors. Dissected and mounted on cloth, with eyelets. [Gives isohyets for 25, 30, 35, 40, 50, 60, 80 and 100 inches and their equivalents in centimeters, grouping together the nine gradations thus obtained by using six shades of blue. This map successfully fulfills the requirements of a good wall map, viz.: generalization and legibility at a distance, attained by boldness of line. Absence of map-net regrettable, however, as, the projection used not being a rectangular one, reference to latitude, for instance—certainly not a negligible climatic factor—is rendered very difficult.]

FRANCE. Carte Albert Barbey au 1/50,000ème [0.79 mile to an inch]. La Chaîne du Mont-Blanc. Topographie par X. Imfeld, Ingénieur. Hypsométrie & Nomenclature par Louis Kurz, Auteur du Guide de la Chaîne du Mont-Blanc. 1910. 3ème édition. Institut géographique et artist. de Kümmerly & Frey, Bern. Rochers par R. Leuzinger. With inset map "Esquisse orographique des Aiguilles de Chamonix à l'échelle de 1:20,000 extraite des triangulations et minutes de levés de la Carte du Massif du Mont-Blanc par H. et J. Vallot." [The third edition of this superb map of the Mont-Blanc Chain. It covers a rough parallelogram included between Martigny-Bourg, the Col de Balme and the Arve Valley to Le Fayet-St. Gervais in the N.W., the valley of the Bon Nant and the Col du Bonhomme on the S.W., the Col de la Seigne, the valley of the Doire and the Val Ferret on the S.E., and the Vallée de Champex on the N.E. In artistic execution it is an excellent example of the Swiss school of cartography, the great value of which lies in the artistic expression of the plasticity of relief, of which the publishers of this map are the chief exponents.]

FRANCE. (1) Carte de la France au 50,000e Dérivée des Levés à Grande Échelle. État d'avancement des travaux au 31 Décembre, 1909. [1:4,700,000 approx. (about 74.2 miles to an inch).] 2 colors. (2) France 80,000e (Type 1889). État d'avancement au point de vue cartographique des travaux de révision au 31 Xbre, 1909. [1:5,650,000 approx. (about 89.2 miles to an inch).] 3 colors. Accompany, as Taf. 48 and 49, notice on "Die Arbeiten des französischen Service Géographique de l'Armée im Jahre 1909," by Dr. H. Haack, *Pet. Mitt.*, Vol. 57, 1, (1911), p. 259-260. [These are the index maps of the two topographic maps of France referred to in their titles. They were originally published as Planches VIII and IX of the Report of the Service Géographique de l'Armée for 1909. They show which sheets have been published and the extent of completion of those not published.]

LAPLAND. Carte de la Laponie Suédoise indiquant la distribution des gisements de pin sylvestre et de bouleau subfossiles, dressée par M. A. Gavelin. 1:2,500,000 (39.46 miles to an inch). Black. Accompanies "Le Recul du Pin

Sylvestre dans les Montagnes de la Suède," by C. Rabot. *La Géogr.*, Vol. 23, p. 272, April, 1911. Reprinted from Skogsvårdsföreningens Tidskrift.

LAPLAND. Carte des limites de la végétation forestière dans la vallée du Kamajokk, Laponie Suédoise. 1:200,000 (3.16 miles to an inch). Accompanies same paper as above, *Le Géogr.*, Vol. 23, p. 273. April, 1911. Reprinted from publications of Swedish Geol. Survey.

WORLD

WORLD. Die Geographische Verbreitung der Grossstädte von Dr. H. Hassinger. [Mercator projection: equatorial scale 1:85,000,000.] Accompanies paper with same title by same author. *Deutsche Rundsch. für Geogr.*, Vol. 33 (1910-11), pp. 385-390. [Distinguishes between cities of (1) 100,000 to 500,000 inhabitants, (2) 500,000 to 1,000,000, (3) over 1,000,000. Choice of projection shows lack of appreciation of the fact that the Mercator projection is not the one best suited to represent world phenomena.]

WORLD. Gegen-azimutale winkeltreue Projektion entworfen von Prof. Dr. H. Maurer. Accompanies, as Taf. 47, paper with similar title by same author, *Pet. Mitt.*, Vol. 57, I (1911), pp. 255-256. [A conformal, retro-azimuthal projection the graticule of which consists of a system of con-focal ellipses and hyperbolas. Of value mainly to navigators and astronomers in the graphic solution of problems of spherical trigonometry. Excludes the circumpolar regions included within 70° N. and 70° S., respectively.]

ATLASES

Atlas Universel de Géographie. Ouvrage commencé par M. Vivien de Saint-Martin et continué par Fr. Schrader. Feuille 55. Indo-Chine. 1:5,000,000 (78.90 miles to an inch). (26° - 6° N.; 86° - 112° E.) 6 colors. Hachette et Cie., Paris. March 1911. 2 frs. [This standard French atlas is fortunately rapidly approaching completion. Sheet 55 is part of the map of Asia, 1:5,000,000, in ten sheets forming Sheets 46 to 55 of the Atlas. It offers a welcome delineation of Indo-China on a larger scale than is to be found in the principal other standard atlases. The usual invaluable list of sources on which the map is based is given. Unfortunately, the list of sheets heretofore published, which is printed on the cover enclosing the map, is not kept up to date.]

OTHER MAP ACCESSIONS

EUROPE. Generalkarte von Mitteleuropa im Massstab 1:200,000 [3.16 miles to an inch] herausgegeben vom k. u. k. Militärgeographischen Institut in Wien. 48 sheets. Revised at various dates from 1902 to 1910. [Each sheet of this map covers one degree of longitude and one degree of latitude, and is officially designated by the meridian and the parallel intersecting in its center and by the name of the most important town on it. In the following the sheets are ranged in meridional strips progressing from W. to E. and, within each strip, from N. to S.] 34° - 49° Brünn; -48° Wien; -47° Steinamanger; 35° - 49° Lundenburg; -48° Pressburg; -47° Pápa; 36° - 50° Troppau; -49° Trentschn; -48° Komorn; -47° Székesfehérvár; 37° - 50° Oswięcim; -49° Neusohl; 48° Budapest, Lozoncz; 47° Budapest, Kecskemet; 38° - 50° Krakau; -49° Leutschau; -48° Miskolcz; -47° Szolnok; -46° Szegedin; 39° - 50° Tarnów; -49° Kassa (Kaschau); -48° Debreczen; -47° Békés-Csaba; -46° Temesvár; 40° - 50° Przemyśl; -49° Ungvár; -48° Munkács; -47° Groszwardein; -46° Lugos; 41° - 50° Sambor; -49° Turka; -48° Szatmár-Németi; -47° Kolozsvár (Klausenburg); -46° Gyula-Fehérvár (Karlsburg); 42° - 50° Lemberg; -49° Stanislau; 48° Máramáros-Sziget; -47° Beszterce (Bistritz); -46° Nagy-Szeben (Hermannstadt); 43° - 50° Brody; -49° Kolomea; -48° Śniatyn; 47° Gyergyó-Szt.-Miklós; -46° Brassó (Kronstadt); 44° - 49° Husiatyn; -48° Czernowitz; -47° Piatra; -46° Kézdi-Vásárhely. [On this standard map of Central Europe relief is in brown hachures, drainage in blue, forests in green and culture and nomenclature in black.] Gift of M. Emile Mosonyi.

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No. 8

PROGRESSIVE DEVELOPMENT OF
RESOURCES IN THE LAKE SUPERIOR
REGION*

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PHYSIOGRAPHIC FEATURES. The Lake Superior region as here discussed includes over 180,000 square miles in Wisconsin, Michigan, and Minnesota, in the United States, and Ontario, in Canada. This area is shown in Fig. 1.

The area includes parts of three topographic provinces: (a) the Lake Superior Highlands, (b) the Lake Superior Basin and (c) the Belted Plain of portions of Wisconsin, Michigan, and Minnesota. The Lake Superior Highlands are part of a more extensive peneplain which truncates Archean and Algonkian igneous, sedimentary, and metamorphic rocks.

The west part of Lake Superior Basin is a rift valley, produced by *graben* faulting in this peneplain, the remainder of the basin being of undetermined origin.

The Belted Plain consists of alternating cuesta uplands with intervening lowlands, in one of which Lake Michigan lies. These are in the Paleozoic sediments, while in part of the Minnesota area the plain lies on Cretaceous sediments.

The region has been nearly all glaciated, but a small portion in the southwest lies in the Driftless Area. It, therefore, has residual

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soils derived from the underlying sandstone, limestone, and igneous and metamorphic rocks.

Another small portion of the area is overlaid by the older drift, its soils being somewhat weathered, transported soils. These two regions are essentially without lakes and have respectively normal, mature drainage and partly-readjusted young drainage.

A third subdivision of the area, comprising the major portion, is covered with the ground moraine, terminal and recessional moraines, drumlins, etc., of the latest (Wisconsin) glaciation, the ice of which came partly from the Labrador and partly from the Keewatin center. Its soils are all transported and are little decomposed. In many places they are stony, sandy, and infertile, although there are large exceptions. Its drainage is youthful and not at all adjusted to the rock structures. Rapids and falls, and lakes and swamps, or muskegs, are most abundant.

The fourth subdivision is the region of lake deposits, especially the clays, silts, and sand laid down in the large marginal glacial lakes, including glacial Lakes Nemadji, Duluth, Chicago, Algonquin, and Nipissing in the Lake Superior and Lake Michigan basins and glacial Lake Agassiz in the valley of the Red River of the North. Here the soils are also transported but they vary greatly in fertility from the somewhat undesirable stiff red clay of parts of the Lake Superior and Lake Michigan borders to the rich silts of the floor of Lake Agassiz in the northwest corner of the area.

The Lake Superior region has an average mean annual temperature of about 45°, 10° to 20° for January and 65° to 75° for July. The annual rainfall is 29 to 34 inches. The climate is affected by the Great Lakes, somewhat modifying a continental climate in the belt of prevailing westerly winds.

GEOGRAPHICAL RELATIONS. At present the Lake Superior region constitutes a peninsula of partial wilderness, projecting into adjacent agricultural lands. At first only those resources were developed which were easily removable and were in demand in the neighboring regions. The physiographic influence upon the development of the region has gone hand in hand with historical progress. The furs were thus first sought, then the forests and fish, then the copper and iron ore. All these are associated with stages in the history of the exploration and settlement of America. The utilization of the Great Lakes in relation to resources outside as well as within the area, has been a factor of great importance, as in the case of grain. Agriculture and manufactures are still in early development in the Lake Superior region.

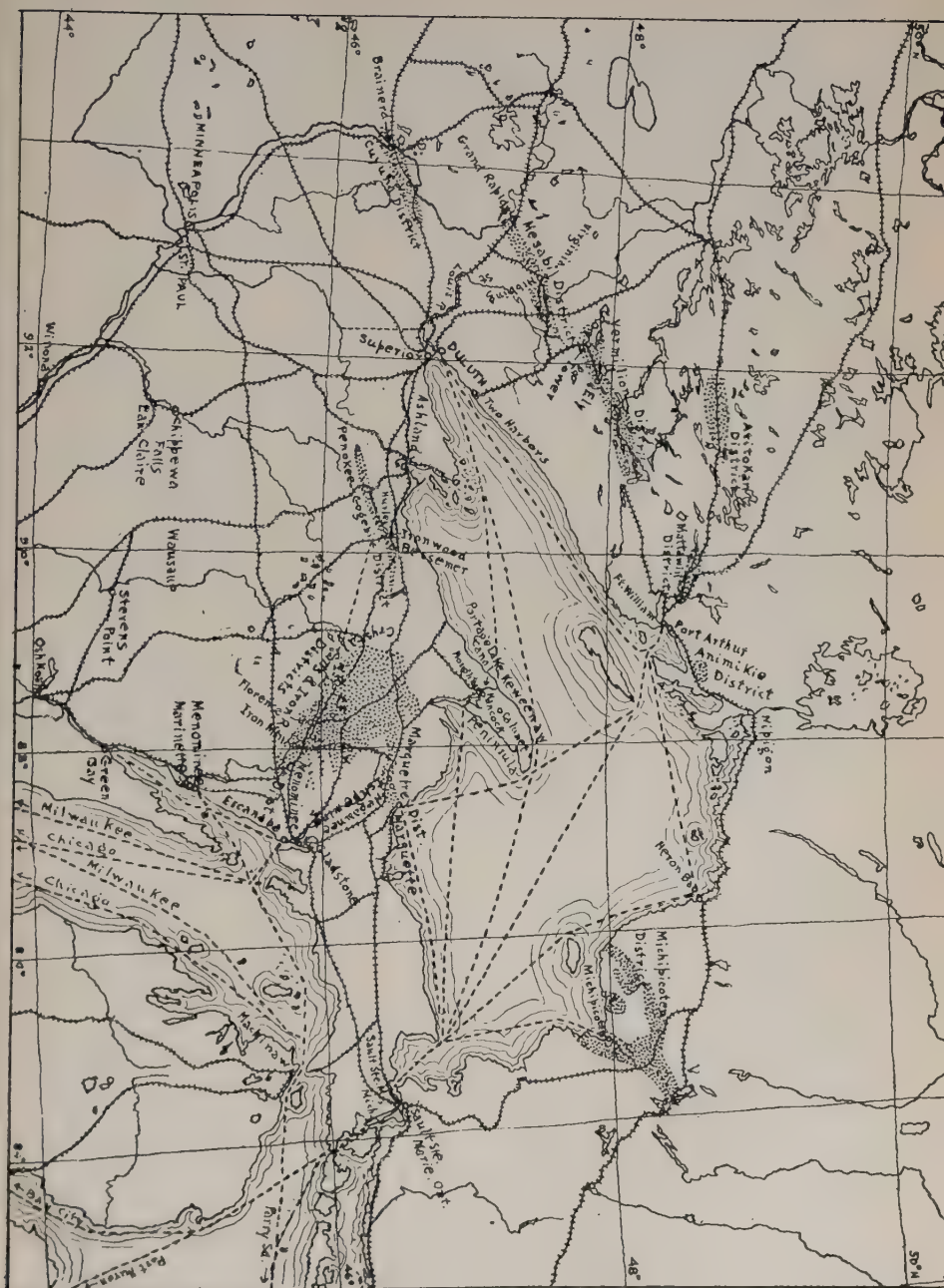


FIG. 1.—Sketch Map of the Lake Superior Region showing Iron Districts and Lines of Transportation. Scale 1:6,000,000 (1 in. = 94.66 miles).
 Iron districts based on U. S. G. S. Monographs 20, 28, 36, 42, 45, 46; railroad lines on U. S. G. S. base-map of U. S. 1:2,500,000, and on

THE CONTROLLING FACTORS. Of the geographical factors influencing the development of the Lake Superior region none are more notable than its natural resources and its routes of trade. Of these natural resources the iron and copper ores are among the most important, but they are not the only ones, the timber which formerly covered the region having produced millions of dollars worth of lumber, while the land itself has enormous agricultural possibilities, as, for example, on the western border of the region where wheat is raised and flour milled the shipment of which from Lake Superior through the Soo is greater in value than that of the iron ore, though with only one-eleventh the tonnage of the ore. In most areas close to Lake Superior the wheat-raising industry is entirely undeveloped.



FIG. 2.—Lake near Nipigon, Canada. A party starting on a long trip through a chain of lakes and streams produced by glaciation.

Among routes of trade the Great Lakes naturally rank first, but the other waterways and the rather low relief of the whole region, through which railroad building has been comparatively easy, are also important factors, as will be seen later.

INFLUENCE OF GLACIATION. One notable geological factor is the fairly recent covering of the region by a great continental ice sheet. The glacier, it is true, had its detrimental features, especially in the removal of certain of the soft ores, as in the Mesabi Range, and in covering many regions, especially the iron ranges, with a great thickness of glacial drift. This covering is well illustrated on the Mesabi and various other ranges where the ore is removed by steam shovels after stripping the glacial soil covering it. At many mines the drift is so thick as to entail a considerable expense for removal. In the newest of the iron ranges, the Cuyuna Range of

Minnesota, the drift is so thick that open-pit work is impossible and underground mining is necessary, adding considerably to the expense of operating the low-grade ores. More than this, the very heavy drift, covering this and other ranges, is responsible for the obscuring of outcrops and for the necessity for great numbers of test pits or diamond drill holes or magnetic surveys to determine the location of the iron-formation rocks.

These detrimental features are partly compensated by advantages also resulting from the glaciation of the region. Some of these ad-

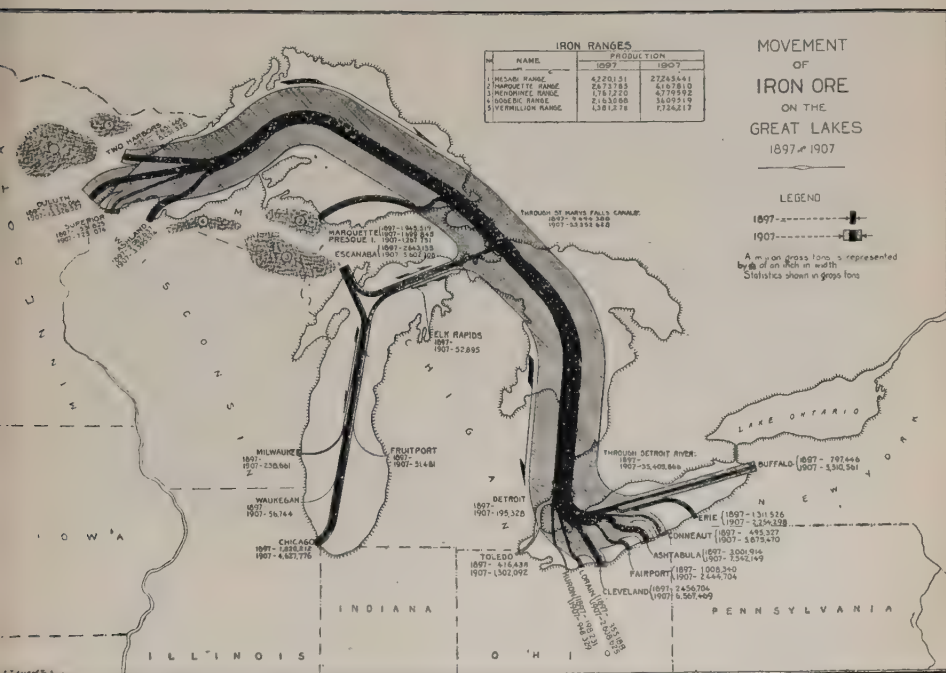


FIG. 3—Increase in Iron Ore Shipments, 1897-1907. (After Commissioner of Corporations.)

vantages are (a) the removal of what must have been a heavy mantle of soil of residual decay on certain of the iron ranges, thus making prospecting for the ores much easier in some districts because of the abundance of outcrops; (b) the development of the new drainage features which did not exist before the glacial period. The prospector for iron ore and the geologist can well appreciate what the difficulties of exploration in the Lake Superior region would have been had not the country been covered with a net-work of lakes and sluggish streams, separated by rapids and short portages, making it possible to travel for great distances by canoe (Fig. 2). Not one of

the Great Lakes, except possibly Lake Superior, existed before the glacial advance, and the region had not a single one of the tens of thousands of small lakes with which it is covered. In the respect then of a highway being provided over which it was easy to travel and explore, and transport ore, lumber, coal, grain, flour, etc., the glacial invasion was distinctly beneficial.

INFLUENCE OF HARBORS. An enormous tonnage of iron ore is carried eastward over Lake Superior and the other Great Lakes (Fig. 3). Coal and other materials are carried to the iron and

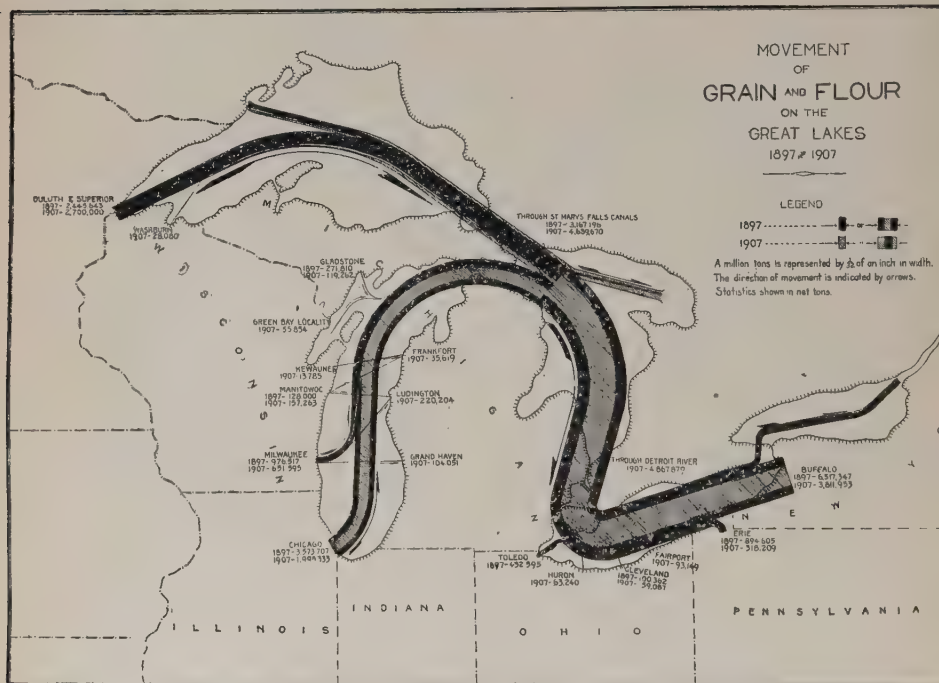


FIG. 4—Increase in Grain and Flour Shipments, 1897-1907. (After Commissioner of Corporations.)

copper country. Naturally, the Great Lakes themselves are far the most important geographical asset in this transportation. A second asset of great value, however, is the series of good harbors which make it possible to load the ore and grain boats with comparative ease and safety. If it were not for the submergence of certain old river valleys, which are thus made into protected landing and loading places, such harbors would not have been available. The harbors at Escanaba, Marquette, and Ashland in Michigan, at Fort William and Port Arthur in Canada and at Two Harbors, Minn. (Fig. 1), have been improved at a comparatively slight expense, so that they

are excellent places for the loading of vessels. The harbor of the Bay of Superior,—at Duluth and Superior,—is one of the best of these ports, furnishing a safe place for loading ore, grain, and lumber and unloading coal, etc., a Haven in time of storms, and a winter refuge for numerous vessels. This harbor exists because the lake waters have been canted into the valley of the St. Louis River, which is even more protected by the building of two sand sits at the head of the lake.

Fort William and Port Arthur, on Thunder Bay, are harbors of importance; Duluth and Superior are also busy ports. From the former two Canadian ports hardly any iron ore is transported at the present time, but grain and flour are shipped eastward from them over the Great Lakes route. The Great Lakes are thus seen to be of importance, a commercial asset in an entirely different industry

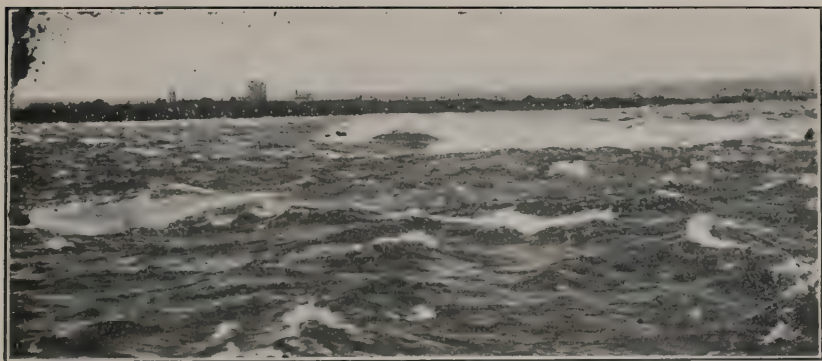


FIG. 5.—The Rapids at the Soo. Sault Ste. Marie, Canada, in the background.

(Fig. 4). The shipping from Fort William and Port Arthur, which was a little over half that from Duluth and Superior in wheat, other grain, and flour in 1906, surpassed these American ports in 1907 in both wheat and other grains, though not equalling Duluth and Superior in flour shipments. This is due to the increased development of the Canadian Northwest. Most of this grain from Lake Superior ports goes to Buffalo and by the Erie Canal and railways to the Atlantic Coast. Some, however, goes by the Welland and St. Lawrence canals to the Canadian seaboard.

INFLUENCE OF SAULT CANALS. Still another factor in the development of this great trade route from Lake Superior to the other Great Lakes and to the Atlantic, is the original connection of all the Upper Great Lakes except Superior by navigable waterways. Lake Superior itself is separated from this great chain of highways by

a navigable river with a short rapid at Sault Ste. Marie (St. Marys Falls, Fig. 5). The descent from Lake Superior to the level of Lake Michigan and Huron is about twenty feet, and the length of the rapids is only about a mile. Accordingly, it was possible to construct a short canal, with locks, at Sault Ste. Marie (the Soo), which would take the vessels past this obstacle. In the infancy of transportation on the Great Lakes, it was necessary to unload the vessels at the Soo, and to reload vessels on the other side.

The Hudson's Bay Company built the first canal, which was on the Canadian side, in 1798. It admitted only batteaux and canoes. The efforts to induce the American government to build a canal at this point were at first unsuccessful, largely through the opposition of Henry Clay, it is said, who could think of no resources of the Lake Superior region the transportation of which would ever warrant the enormous expense of the canal.

The State of Michigan undertook the building of the first ship canal* as early as 1837, although the canal was

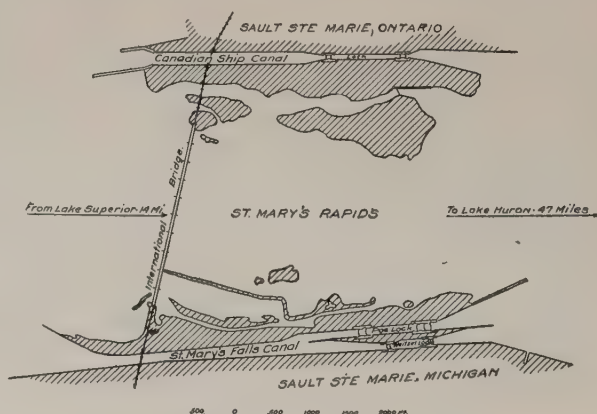


FIG. 6—The Rapids, Canals and Locks at the Soo.

not completed until 1855, because of lack of support by the national government. It cost \$1,000,000.

The American government started to rebuild this canal and lock in 1869, completing the work in 1881. A second lock (Fig. 6) was started in 1887 and completed in 1896. The cost of these two locks and improving the canal and river was \$10,000,000. The Canadian canal and lock were built between 1892 and 1894 at a cost of \$4,000,000. The construction of still another and longer lock is said to be contemplated on the American side.

The increase of traffic through the Soo is indicated by the fact that these three new locks (two in the United States and one in

* This and many other statistics on the Sault Ste. Marie canals are from the annual report of the Chief of Engineers of the United States Army; the Blue Book of American Shipping, 13th Annual Report, 1908, 423; and from an article by E. E. Ferguson, *Bull. Amer. Bureau of Geogr.*, II, 1901, 74-88.

Canada) have already been necessary since the first one, while the increase in the size of vessels is shown by the relative dimensions of the various locks:

	LENGTH.	WIDTH.	DEPTH.
Two Michigan Locks, each....	250 ft.	70 ft.	11 ½ ft.
Weitzel Lock.....	515	60	17
Poe Lock.....	800	100	22
Canadian Lock.....	900	60	22

THE SAULT CANALS AND THE DEVELOPMENT OF LAKE SUPERIOR IRON MINING. This increase in the size of the canals is partly due to the increasing wheat shipments, but almost entirely to the iron ore transportation, due to the wonderfully rapid increase in iron mining in the Lake Superior region. The vessels have increased to a length of 605 feet,* 60 foot beam, depth of 32 feet and a capacity of 13,000 and even 14,000 tons. Sailing vessels are fast going out of the lake traffic. They carried 30 per cent. of the tonnage at the Soo in 1895, 15 per cent. in 1905.

With the increased saving in time of loading iron ore (a cargo of 9,277 tons has been loaded at Duluth, for example, in 70 minutes) and of unloading (10,346 tons being unloaded at Cleveland in 4 hours and 10 minutes) and the saving of delay in the Soo locks (normally the only place of delay in the whole route), it is possible for one boat to make many trips from the head of the lakes or from other ore ports to the Lake Erie ports in a season. This is why several large and fast-working locks are necessary. It was estimated that the five days' delay incidental to the sinking of a vessel in the St. Marys River below the canal in 1900, holding back only the vessels drawing over 13 feet, resulted in a loss of \$500,000 to the various operators of vessels. With delays eliminated, many and fast trips can be made. The *W. E. Corey* made thirty trips from Duluth to the Lake Erie ports in 1906, carrying 302,000 tons of iron ore. The more trips made the cheaper the rate of transportation. In 1907 the rate varied from seventy-five cents (Duluth to Lake Erie ports) to seventy cents from Marquette and sixty cents from Escanaba, which is much less (about one-fifth) than the minimum railway rate or the rate if vessels had to be unloaded and loaded again at the Soo. Contrast this with one and eight-tenths cents a bushel, the 1907 rate on wheat, which is bulkier but not so heavy, from Duluth to Buffalo, by lake, and with the rate on coal, the only bulky commodity going west (Fig. 7), on which the rate from Lake Erie ports to Duluth, by lake, was only thirty cents per ton in 1907.

The cost of the Soo canals, even without tolls, is paid over and

* The Atlantic liner "*Lusitania*" is 785 feet long.

over again in this cheapness of transportation. The expenditures involved in their building have been more than warranted by the enormous traffic which goes through the canals at Sault Ste. Marie. Although the season for lake transportation is limited to less than eight months, the canals at Sault Ste. Marie carry a greater tonnage than any other canals or other waterways in the world, surpassing even the Suez Canal, which has been and is still the great route of trade between Europe and Asia and is open the year round, as is the Kiel, or Kaiser Wilhelm, Canal between the Baltic and North

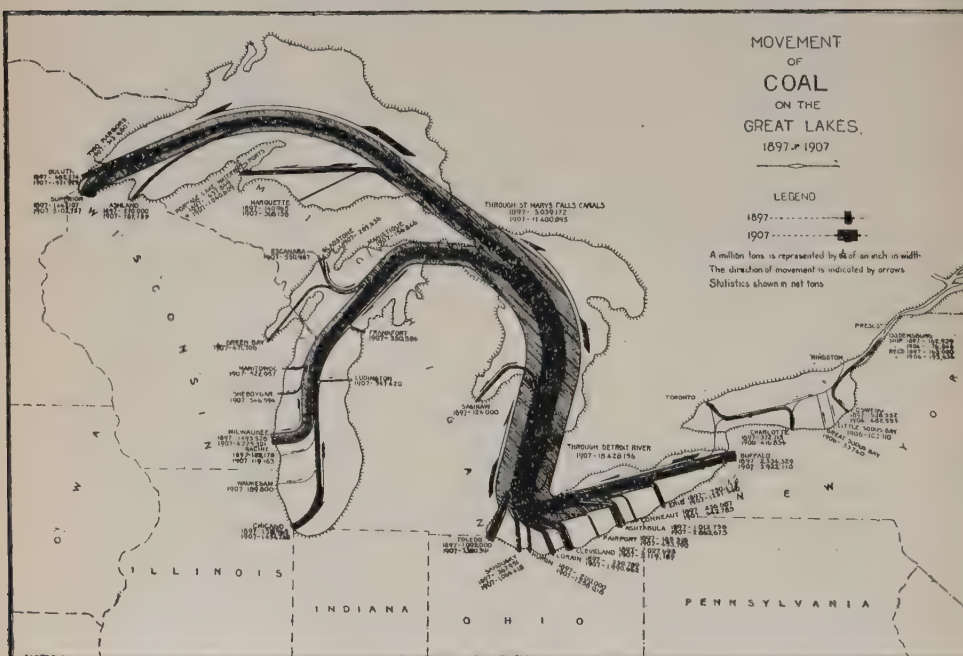


FIG. 7—Increase in Coal Shipments, 1897-1907. (After Commissioner of Corporations.)

Seas in Germany. The net tonnage at the Soo* was three times that of the Suez Canal in 1906 and seven times that of the Kiel Canal. It increased between 1906 and 1907 by a tonnage nearly equal to the combined tonnage of the Suez and Kiel Canals in 1906, as the following table shows:

SOO.	SUEZ.	KIEL.
1895...16,806,781 tons net	8,448,383 tons net	(not open)
1900... 22,315,834 " "	9,738,152 " "	3,488,767 tons net
1905...36,617,699 " "	13,132,694 " "	5,270,477 " "
1906... 41,098,324 " "	13,443,392 " "	5,796,949 " "
1907...58,217,214 " "	.....	.....

* Transportation by Water, United States, 1906, Bureau of the Census, *Bull.* 91, 1908, p. 46.

This comparison of the traffic at the Soo, Suez and Kiel Canals shows a large yearly increase in the case of the Soo Canals. This is related partly to the great growth of production of wheat farther west, both in United States and Canada, but mainly to the increase in the iron production (24 per cent. 1903-1905) largely in the region tributary to Lake Superior (and not including Lake Michigan) and especially on the Mesabi Range (which had five-fold increase of tonnage shipped, 1902-1905). These figures give no account of the shipments by the Great Lakes from the Menominee and Crystal Falls districts, whose chief ports are Escanaba and Gladstone (Fig. 1), and whose vessels do not pass through the Soo canals.

The traffic past Detroit, which would include this and other Lake Michigan and Lake Huron traffic, amounted in 1906 to over 70,000,000 tons, carried in 25,000 vessels. This includes a season of 230 days and a different proportion of west-bound as well as east-bound traffic, for example, part of the commerce of Chicago.

The greater part of the iron ore is carried in vessels belonging to the iron and steel companies which own or operate many of the mines. In 1906 the United States Steel Corporation (Pittsburg Steamship Company) had 101 vessels with 368,165 aggregate gross tonnage, 16 per cent. of the total gross tonnage of the Great Lakes.* The Gilchrist Transportation Company had 62 vessels with 190,890 tons gross register. The latter are not allied directly to any of the iron or steel interests, as are the various other steamship operators who handle ore and coal. The package freight service, carrying goods readily transferred from cars to boats, are practically all owned or run in connection with the great trunk line railways like the Pennsylvania Railroad, the New York Central, the Canadian Pacific Railway, etc.

The freight tonnage carried through the Soo canals in 1888, 1890, 1895, 1900, 1906 and 1907 follows, comparative analytical figures for 1900 and 1907 being given for the sake of showing the preponderance of the iron ore traffic and its great increase. The other products shipped are of notable bulk and value and show large increases as well, except the yearly fluctuations of grain, and the diminution in lumber shipments. They come nowhere near the iron ore traffic in tonnage,† the iron ore making 89 per cent. of

* From statistics by Walter Thayer, "Transportation on the Great Lakes," in *American Waterways, Annals Amer. Acad. Polit. and Soc. Science*, XXXI, 1908, 126-138.

† 1900 figures quoted from *Bull. Amer. Bureau of Geogr.*, II, 1901, 87-88; 1907 figures and general data for 1888-1906 from Monthly Summary of the Internal Commerce of the United States, December, 1907, Bureau of Statistics, Department of Commerce and Labor, 1908, 631-632; and from *Transportation by Water*, 1906, United States, *Bull* 91, Bureau of Census, 1908, 46.

the east-bound traffic by tonnage. The west-bound traffic is not quite a quarter of the east-bound, ninety per cent. of it being coal.

1855.....	—	vessels, carrying	14,503	tons worth	\$ ———
1880.....	3,503	"	"	1,244,279	" "
1888.....	7,803	"	"	6,411,423	" "
1890.....	10,557	"	"	9,041,213	" "
1895.....	17,956	"	"	15,062,580	" "
1900.....	19,452	"	"	25,643,073	" "
1906.....	22,155	"	"	51,751,080	" "
1907.....	20,437	"	"	58,217,214	" "

(16,475 vessels in 1906 by the United States canal and locks,
5,680 " " " " " Canadian " " lock.)

Tonnage shipped via Soo canal 1855-1895: 101,244,462 tons.

" " " " " 1895-1907: 427,148,680 "

Total shipments via Sault Ste. Marie, 1855-1907, 528,393,142 tons.

Total iron ore shipments, 1854-1907, except Menominee (*i.e.*, practically ore shipment via Soo), 464,751,429 tons; iron ore 81 per cent. of total Soo tonnage.

Eastbound:		TONS.	1900	TONS.	1907
Iron Ore.....	16,443,568	.....	.....	39,594,944	.....
Pig Iron.....	.....	.....	.....	20,406	.....
Copper.....	131,066	.....	.....	89,959	.....
Wheat.....	.....	( 40,489,302 bu.)	.....	.....	( 98,135,775 bu.)
Other grain.....	.....	( 16,064,225 bu.)	.....	.....	( 43,401,186 bu.)
Flour.....	.....	( 6,754,876 bbls.)	.....	.....	( 6,524,520 bbls.)
Lumber.....	.....	(909,651,000 feet)	.....	.....	(649,320,000 feet.)
Building stone.....	48,902	.....	.....	898	.....
General Merchandise	.....	.....	.....	106,075	.....
Passengers.....	.....	.....	.....	.....	(31,710 persons)
Total Eastbound	.....	.....	.....	.....	.....
Freight.....	.....	.....	.....	45,544,319	.....
Westbound:		TONS.	1900	TONS.	1907
Hard Coal }	4,486,977	.....	.....	1,506,668	.....
Soft Coal }	.....	.....	.....	9,893,427	.....
Manufactured Iron..	.....	.....	.....	287,535	.....
Flour.....	.....	.....	.....	.....	( 250 bbls.)
Grain.....	.....	.....	.....	.....	( 2,152 bu.)
Salt.....	.....	.....	.....	.....	(460,802 bbls.)
General Merchandise	.....	.....	.....	916,579	.....
Passengers.....	.....	.....	.....	.....	(31,048 persons)
Total Westbound	.....	.....	.....	.....	.....
Freight.....	.....	.....	.....	12,672,895	.....
Total freight ton-	.....	.....	.....	.....	.....
nage.....	25,643,073 tons	.....	.....	58,217,214 tons.	.....

The proportional value of the products carried through the Soo canals in 1906, was:

	VALUA- TION.	PER CENT. OF TOTAL VALUATION.
Iron ore.....	\$121,981,795	Iron ore..... 23 1/5%
Wheat, other grain and flour..	133,281,196	Cereals 24 3/5%
Copper	36,595,220	Copper 6 4/5%
Coal	25,136,044	Coal 4 3/5%
Lumber	19,813,882	Lumber 3 3/5%
Manufactured iron, pig iron, salt, and building stone.....	30,427,667	Mfg'd iron, etc... 5 3/5%
Unclassified	170,227,650	Unclassified 31 3/5%

(To be concluded.)

A REVIEW OF THE WATERWAY PROBLEM

BY

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The agitation of waterways has been so persistent during the last few years, so much has been said and published and so many phases of the question have been disclosed, that our national waterway problem is in danger of being embarrassed, not by too much data, but by too many opinions. It is well for the findings of the numerous committees to be presented, apart from formal reports, and to this end a review of the following recently published documents on our waterways is undertaken:

- A. Preliminary Report of the Inland Waterways Commission. Government Printing Office. 1908.
- B. Report of the Commissioner of Corporations on Transportation by Water in the United States. 3 volumes. Government Printing Office. 1909.
- C. Report by a Special Board of Engineers on Survey of Mississippi River. Government Printing Office. 1909.
- D. Report of the Mississippi River Commission. Government Printing Office. 1909.
- E. Transportation by Water. Census Bureau. Government Printing Office. 1908.
- F. Report of the National Conservation Commission. Government Printing Office. 1909.
- G. Preliminary Report of the United States National Waterways Commission. Government Printing Office. 1910.

For over twenty years our waterways, and especially the Mississippi courses, have shown a constantly decreasing volume of trade. On the other hand, the reports of the railroads of the country have detailed an enormous increase of traffic, so much, in fact, that our railroads in times of bountiful production have not been equal to the demands of the areas which they serve. At St. Louis, the total amount of freight in tons received from railroads during 1908 was 23,577,922, and from the river 293,180, or a little more than one per cent. of the importation was by river lines (C. 351). The city is entered by twenty-nine lines of railroads, directly or indirectly, and it is the converging point of a river system that spreads over the whole interior basin of the United States. Antwerp, Belgium, on the other hand, receives twice as much freight from the waterways as from railroads. New Orleans, with a population of 290,000 and

situated 106 miles from open water, compared with the ports of Hamburg, with a population of 850,000 and located 160 miles from the sea, and Antwerp, with a population of 400,000 and 55 miles from the sea, makes a poor showing for a waterway town. The entrances to these ports are practically alike by means of a 26-foot waterway of ample width. New Orleans' export and import trade amounted, during 1908, to 3,500,000 tons, of which 1,400,000 tons were in coal from up the river; Hamburg imported goods to the amount of 11,000,000 tons, and Antwerp imported over 9,400,000 tons; the American city sent less than five per cent. of the total tonnage of trade (160,000) tons up the valley, the German city sent seventy-three per cent. (8,000,000) tons of the import up the Elbe, and the Belgian city, eighty per cent. (7,500,000 tons) of its imports up the Scheldt (C. 350). Hamburg has in the hinterland 7,500 miles of rivers and canals of less than eight feet depth, Antwerp has 1,200 less than ten feet, while there is a possible 13,000 miles of waterway open to navigation down to six feet, at various degrees of efficiency, inland from New Orleans.

It is necessary to warn readers that German and Belgian trade statistics are not fairly comparable with those of the southern part of the United States. Many circumstances make quite different conditions. The geographic location of New Orleans is not favorable for trade. It is somewhat apart from the great traffic lines, while Antwerp and Hamburg are in part termini of the heaviest freight traffic highway in the world. Again, New Orleans does not have a dense population in the inland region abutting the rivers. The area (29,620 square miles) adjoining the Mississippi River from St. Louis to New Orleans has about 2,046,000 inhabitants, which makes a population of 76 per square mile including the cities, or about 38 per square mile outside of the cities, and the seven States adjoining the lower Mississippi has a density of population of 46, which rather sparse population gives little opportunity for local commerce. Belgium has a density of population of 620, and Germany of 290. The seven Mississippi River States, Illinois, Missouri, Kentucky, Tennessee, Arkansas, Mississippi and Louisiana, together have about one-fourth the total population, seven-fourths the area, one-seventh the density and eight-sevenths the total railroad mileage of Germany alone (C. 324). In the third place, the United States is largely developed by railroads. This is in part the result of the extensive domain which contains areas of great productivity, separated from each other by rather long journeys. Moreover, many areas of this country comparable in possibilities with the densely populated re-

gions of Europe, contain a comparatively sparse population. Thus the southeastern portion of the United States if "settled like the New England State of Massachusetts, would contain 40,000,000 of people; if like Saxony, it would hold 20,000,000 more than the present total population of the United States; area for area it has resources of all kinds several times greater than those of Saxony."

The development of the United States by railroads is also in part due to the topography of the United States, which, unlike European countries, has no dominant natural central or longitudinal strategic vantage ground, but is somewhat separated in diverse physiographic provinces. New England's manufacturing plants have been located far from the raw materials, the major part of the food of the operatives is brought from a distance, the coal for warmth and power comes from without its borders and, in general, rapid and persistent transportation is necessary in order to maintain the standard of its output. Certainly, if the demand for rapid transit obtains in a country of tremendous magnitude and in a land where manufacturing plants are established and highly developed in scattered and somewhat in topographically remote places, there can be no great development of transportation by water. The great basins of our large rivers are not the most highly populated regions of the United States as they are in other regions of the world, and this in any waterway consideration is a vital point. In years to come, the alluvial basin of the Mississippi River may support a dense population and then the development of the waterway will be a natural and easily obtainable project; until then there must, to some degree, be given to the steamship companies the assurance of protective measures. If we eliminate, in considering European waterways, the factors which represent a difference mostly of historical status, and which stand to-day as a difference of density of population, of stability of population, of habits of trade, of priority in highway rights, and of relationship between railways and waterways, there will be found some encouragement for the future of our own waterways development.

The decline in the Mississippi River traffic in twenty years has been large. The official figures give for the Upper Mississippi a decline of 71.9 per cent.; the Ohio, 3.6 per cent., and the Lower Mississippi, 59.1 per cent. At St. Louis, the water shipments fell from a total of 600,000 tons in 1890 to 89,000 tons in 1906, while the railroad shipments increased from 5,000,000 tons in 1890 to 17,000,000 tons in 1906 (B, II, XXIII). Instance after instance may be specified. There is no doubt about the fact of the decline, consequently the discussion to-day accepts it and turns to the proposals of rem-

edies. The result of all this investigation is an increasing interest in waterways generally and in the specific problem of the Mississippi. The unbiased presentation of the causes of the decline in traffic is necessary in order to know where to apply the remedial agents. These causes lie probably about as follows:

1. In the river itself.
 - A. The unreliability of the depth of water.
2. In the nature of the carrier.
 - B. The river boats have not improved in fifty years.
 - C. The terminals and systems of unloading and loading have not improved.
3. In the character of the commerce.
 - D. It is restricted to the movement of freight between river points only.
 - E. It is necessary to transship goods.
4. In the competition.
 - F. Railroads are allowed to compete with river lines and at times their methods are questionable.
 - G. River lines have burdens of insurance, wharfage charges, and the like to sustain.

A. The unreliability of the river.

The cry for a 14-foot channel along the Mississippi River, connecting the Great Lakes with the Gulf, arose in 1902, and has persisted. The Report of the Special Board of Engineers should in a great degree silence this demand and aid us in turning our energies towards more suitable projects. The Board investigated seven methods, all of them possible, of maintaining a 14-foot channel and estimated the amount of work necessary to be done, the first cost and the annual cost of operating and maintaining the plant.

These methods are by dredging, regularization, canalization with movable dams, canalization with fixed dams, lateral canals, reservoirs and a combination of methods. Only two of these are considered here.

1. Reservoirs. This system for improving the Mississippi River has strong advocates and as strong opponents. The discussion on the merits and failures of this plan has been at times heated. Reservoirs for the impounding of the excess of water during flood time and for supplying the low stages with enough water for navigation were advocated early in the history of the improvement of the river. Throughout all the discussion, opposition to reservoirs has been strong

enough to prevent much experimentation along this line. There has been established, however, north of St. Paul on the Mississippi River a system of five reservoirs covering, in total, 480 square miles. While the original recommendation included more reservoirs in this system, it has been impossible to obtain the requisite appropriation from Congress. The Board, after an examination of the effects of this system of reservoirs, which they state is the largest system of artificial reservoirs in the world, does not believe that any extension of its application to the Mississippi River below St. Louis will be attended with any approach to the desired result, and furthermore, that the cost of installing the system would be incommensurate with the benefits to be derived. The arguments against the reservoirs are:

a. With reservoirs at the headwaters of the tributaries, it would be impossible to forecast the time of discharge in order to benefit the low water stage. The effect of a flow from the above system cannot be felt in St. Louis within a two-month interval after the discharge begins. This interval is too long in a river where the drop in stage is neither regular in time nor in degree.

b. The storage reservoirs of the International Waterways Commission on the various tributaries have a capacity of 540 billion cubic feet. Arguing from the effects of the Mississippi system, the Board concludes that the "rise of the river bed indicates that the maximum of 540 billion cubic feet total storage, which might be obtained by reservoirs in the Mississippi River Basin from the Illinois River upward, could not maintain throughout the year more than eight feet available depth between St. Louis and Cairo, the increased discharge from the reservoirs tending to create a wider channel rather than a deeper one, and being useful, therefore, only as an auxiliary to other methods of improvements. To hold the water stage at St. Louis at 22 feet, the stage corresponding to a controlling depth of 14 feet between St. Louis and Cairo, would require over 5,000 billion cubic feet annual storage, or about ten times what has yet been found possible." This is practically the attitude of the Mississippi River Commission.

Before the days of the Mississippi River Commission, Ellet proposed a series of reservoirs for the tributaries of the Ohio to impound enough water, not only to reduce the flood height, but also to supply water during the low water stages. Leighton's scheme* does not differ in kind from Ellet's. In the plan before us to-day, 100 reservoirs with an enormous capacity and with a much broader distribution are provided. The objections made to Ellet's plans were in the

*W. A. Dupuy. Handling the Rivers of the Nation. *World's Work*. March, 1908. 10011.

main in two lines, that the reservoirs would have to be located on valuable sites and that the effective handling of the impounded waters would be an almost impossible task. Leighton's plan must also be open to the same objection, but the salve has been administered for the great financial outlay by a promise of great dividends from the water power. "A purely nominal rental would be ample enough to repay in two or three decades the entire original expense of the system, besides a good income on the investment." Enthusiasts for reservoirs see all the ills that rivers are heir to cured by this system. "The proper building of reservoirs in the headwaters, therefore, offers what no other plan can possibly offer: it promises effective regulation of river stages and water supply for all time to come, removing entirely the liability of destructive floods, checking the erosion of banks and preventing much of the formation and shifting of sand bars and the pollution of water which the presence of sediment means."*

2. The Board commits itself to the recommendation of the continuation of the works of partial regularization of the stretch of the river from St. Louis to Cairo which will yield an eight-foot channel and then to obtain the fourteen feet by dredging; and south of Cairo, of the protection of the existing banks and of dredging. This is largely the policy of the Mississippi River Commission to-day. The recommendations of these two commissions could not be expected to vary in any degree, inasmuch as three out of five members of the Board are also members of the Commission.

The Board's most reasonable recommendation, however, is the abandonment of the fourteen-foot waterway project on the ground that all the commerce of the valley, present and prospective, can be adequately carried by a nine-foot channel. In commenting on this report Congressman Kunsterman of Wisconsin detailed the situation on European rivers with the text "that over in Europe the boats are made to conform to the existing river channels, while here we want to dig channels to conform to the needs of deep-draft ships."† The same speech contained the statement that the Rhine, with an average depth of six feet, carries an annual tonnage of twenty million; the Elbe, with a four and one-half foot average, eight and one-half million, and the Volga, with an eight-foot average, carries fourteen million. This recommendation against the fourteen-foot waterway is, perhaps, the most important turn which has occurred to our waterway affairs during the last few years. The survey for

* W. S. Tower. *The Mississippi River Problem. Pop. Sci. Monthly.* LXXIII, 26 July, 1908.

† *Cong. Record*, 61st Congress, 2nd Session. 45, 2019.

a fourteen-foot waterway was provided for by the River and Harbor Act of June, 1902, from the mouth of the Illinois River, via the Mississippi, to St. Louis, in connection with a fourteen-foot waterway from Lockport, Ill., to St. Louis. Such a waterway between the Lakes and the Gulf would have been a burden, and the outlay for construction and maintenance unnecessary. The Secretary of the Mississippi Valley Transportation Company, in a recent speech, describes the boats which that company has designed for the Mississippi River. The boats are 350 feet long, 50 feet wide and 10 feet deep in the hull; they will float in fifteen inches of water; 600 tons gives them a draft of three feet; 1,200, four feet; 2,200, six feet, and 4,000, nine feet. A thirty-inch navigable depth on the Oder River in Germany sustains three and one-half millions tons of freight annually. Large boats of the coastwise pattern or Lake type could not navigate the tortuous course of the river, even if these would float in a fourteen-foot channel. The idea of seagoing vessels sailing from Chicago via the Mississippi River is preposterous.

The Mississippi River Commission has been remarkably successful in maintaining a nine-foot channel south of Cairo. During the low water season of 1908 (E. 2646), under the stress of an unusually low stage of long duration, considerable effort was required to keep the crossing open. A number of the crossings had less than the required depth before the arrival of the dredges. At one crossing there was only six feet of water, but this was increased easily to nine feet. Four other sections were recorded with a depth from seven to eight feet. It is fair to add that three dredges were withdrawn from the regular service during the season to perform experimental dredging under another project. The river during the low water stages has been in very good condition for navigation, and the unreliability of previous years has to a large degree disappeared, but the river cannot be said to be entirely trustworthy. The sense of uncertainty has been kept alive by the departures from the stage of nine feet set by the Commission as a minimum.

B. The river boats have not improved in fifty years. The flat bottom stern-wheeler is and has been the prevailing type of steamboat on the Mississippi (E. 171). These in 1906 comprised 69 per cent. of the number and 74 per cent. of the gross tonnage of steam vessels. About six per cent. of the number with a gross tonnage of nineteen per cent. were side wheelers, which were employed in freight and passenger and ferry service. Less than one per cent. in number and in tonnage were center wheelers used for ferry service, and twenty-five per cent. were of the screw propeller

class, but these carried only six per cent. of the total tonnage. Much local traffic is carried by gasoline boats under fifteen tons which are not subject to official inspection. In addition to self-propelled boats, there are many barges used as bulk carriers. These unrigged craft constitute on the Mississippi system 85 per cent. of the total number of vessels and 96 per cent. of the total vessel tonnage. Most of these are engaged in the coal trade on the Ohio.

While there has been a betterment in the bulk carriers, which is largely limited to coal and the gradual displacement of the old wooden barges by steel ones is now going on, and while, perhaps, the stern-wheeler is the best sort of vessel for the river, the service, especially of the packet boats for freight and passengers, has been far from satisfactory. Certainly, the peddling of freight and passengers will not mean a large business: it is far different from being a regular carrier of the products of great industries. In the former case the load is accidental; in the latter traffic is sure and regular. "Freight cannot be carried by railroads in the main-line business in mixed trains which stop to pick up their cargo at the depot platform. How absurd it would be if the Pennsylvania Railroad should announce in the papers of the day that they would receive freight at the Union Depot, and that a train would come through about 4 o'clock and stop there while the freight was trucked aboard; and if they should add to this announcement the fact that this train would take passengers for New York! It sounds laughable, but it is no more laughable than any one of the announcements in the papers of New Orleans, Memphis, Vicksburg or St. Louis, or any one of a hundred other cities, every day of the year, that the magnificent new steamboat *Centurion* will receive freight and passengers to depart at 4 o'clock at the levee to-day, for Greenville and the Bends, or wherever she may be headed for."*

C. The terminals and systems of loading and unloading have not improved. The landing on the Mississippi River is a location near an undercut bank, where the vessel can be forced near enough to the shore for a gangway to be lowered. This means has a certain advantage from the standpoint of expense, unless the amount of goods be large, but it is very profligate of expense if a through boat attempts to stop at all the landings. In the case of a purely local traffic between farms and plantations, no odium can be attached to it. The reports of the numerous boards which have investigated the traffic of the Mississippi state that the terminals at the larger river ports are in a backward state. In general, the indictment is that, at

* *American Forestry*. XV, p. 34.

many points, there has been but little improvement of the natural banks and, at many more points, there has been a dearth of mechanical devices for handling freight, and at some points, owing to the variations of the stage of the river, floating freight sheds are used from which the freight is laboriously dragged up the levee (B. III, 202). The lack of loading and unloading facilities increases the cost of operating when the tonnage is large, by increasing the size of the crews, consequently Mississippi River steamboat crews are larger than those of the coastwise and lake traffic (E. 177). For the coastwise service, the average is one man for every 42 tons of gross tonnage; for the Lakes, the average is one man for every 107 tons, while on the Mississippi River it is one man for every 8 tons. In contrast with all other traffic, the coal traffic of the river system ought to be considered. Coal, sand and stone constitute 86.9 per cent. of all the barge freight of the river (E. 183), and these commodities on specific rivers, as the Ohio, form 91.6 per cent., and the lower Mississippi 46.5 per cent. At the Port of Pittsburg coal constituted 75 per cent. of the total commerce; at New Orleans, about 1,200,000 tons of coal is received by river shipments. There has been an important increase in the coal traffic, especially of the Monongahela River. This coal traffic is largely owing to the enterprise of the Monongahela River Consolidated Coal and Coke Company. The terminals of this company are similar to all great port terminals, and are in strong contrast to the terminals used generally on the river. This comparison leads a Congressman, in consideration of the River and Harbor Bill, to say "that with proper equipment for river navigation we can do as well and better (than in Europe) in the United States is evident from the fact that coal is shipped from Pittsburg to New Orleans in barges of eight feet draft at three hundred and seventy-six one-thousandths of a cent per ton mile—a little over one-third of a cent per ton mile. The average ocean freight in ships of 21-foot draft is thirty-five one-hundredths of a cent per ton mile—just a trifle less than that shipped on barges on the Mississippi. Now, what enables the coal companies to ship coal on the Ohio and Mississippi Rivers at such low rates? Simply the fact that they have proper terminals and proper machinery to load and unload their coal at a minimum cost. I doubt whether the cost of transportation would be lessened the least part of a cent if the 14-foot project were carried out and barges of 12-foot draft, instead of 8 feet, be used. Certainly not a sufficient deduction in transportation would result to warrant the great expenditure of a 14-foot channel."*

* *Cong. Record* 45. 2019.

The rights of the water-fronts in the various cities of the valley are variously distributed, but in general they are to a large degree out of the public control. Thus Pittsburg has a river front of 30 miles; of this six and one-fourth miles are owned by the city, railroads own ten and five-eighths, and the railroads and industrial concerns occupy all the Ohio and Monongahela frontage except two and one-half miles. Cairo has six and one-half miles of river front; the city owns none; railroad lines occupy the frontage on both the Mississippi and Ohio Rivers, except a length of about twenty blocks. Memphis owns its entire frontage of five miles, but a part of the frontage is occupied by tracks (B. III, 228).

D. Freight is restricted to movement between river points only. The river line is to a large degree fixed in direction. It may or may not trend in the path of the greatest commercial activity; it may or may not connect areas yielding raw materials with areas of manufacturing advantages; areas yielding food products with areas of dense population; or regions of great industrial output with regions that might be a market. River lines, on the other hand, generally connect the interior with the coast, and this, in a country of limited area, is more apt to be the line of trade than in a country of wide expanse. Large cities are sometimes developed by railroads in locations apart from the waterways, and some of the cities, like Worcester, Mass., and Birmingham, Ala., are industrial and manufacturing centers of no small magnitude. In the history of transportation, canals and waterways preceded railroads. In densely settled countries, as Germany, where the resources are largely known, the location of waterways are in line of permanent trade, and because water transportation is cheaper than rail, these water routes have persisted and have been eminently successful. In a newer country, like the United States, where the center of population has been gradually shifting and where the line of great industrial movement has not become constant, waterways cannot have a development comparable with the railroads. This topic is further expanded under the following heading:

E. Transshipment is necessary. Two points are considered here: the impossibility of ocean or lake vessels using a river channel and the possibility of the use of waterways for a part of a long distance haul because of cheaper rates.

The type of vessel for lake or ocean traffic must necessarily be different from the type best adapted to river traffic. The storms to which the former are subjected increases the cost of building so that an ocean vessel costs about \$71 for each ton carried; on the

Lakes, where storms are less violent, \$41.50, while a tugboat and ten barges capable of transporting 10,000 tons of freight on an eight and one-half foot draft cost about \$12 (C. 24). Besides the item of expense there is the question of limits of navigability due to the irregular course of a river highway and to the depth. It would never pay to straighten the river for ocean craft and, as it is, the long and narrow ocean and lake type could not navigate the bends with the rudder power only sufficient for open sailing. A fourteen-foot waterway would not yield depth enough for ocean and lake traffic. The tendency has been towards vessels of greater draft, and it is reported that but a comparatively small portion of the steamers of ocean commerce could use a fourteen-foot harbor.

It is apparent that much of the material for river shipment in the United States comes from or is destined for points not on the river. In the case of coal from Pittsburg, the bulk carriers are loaded directly from the mines and are loaded into the holds of ocean-going vessels at New Orleans with very little handling. Coal is the largest commodity carried on the river; it is bulky freight and ought to be carried by water at a cheaper rate than by rail, and the difference in the rates should be enough to give good interest on proper methods of handling the coal at the terminals. Yet during 1906, in a table compiled from the "Mineral Resources of the United States" (B, II. 256), there is shown that 37,000,000 tons of coal were shipped to and through Pittsburg, 12,000,000 to and 25,000,000 through. Of the 12,000,000 tons, 5,000,000 came by rail and 7,000,000 by water; of the 25,000,000 tons shipped through Pittsburg, 22,500,000 went by rail and only 2,500,000 tons, or about eleven per cent., was carried by river lines. The present traffic of the system is made up largely of commodities where the necessity of transshipment is slight, and includes forty per cent. of the total traffic in coal, twenty-five per cent. in logs, fourteen per cent. in stone and sand, five per cent. in package freight, and the remainder variously distributed with less than four per cent. in agricultural products. Very little traffic is done where the river is made a means of low rates as a part way of a long distance haul; and even in large centers, as Cincinnati, the river brings but a small per cent. (33) of the coal distributed to the district.

F. Competing lines of railroads and their methods. There are certain advantages accruing to railroads which arise from the nature of the carrier. These have been stated above in the negative way from the standpoint of water traffic, and they embrace the possibility of lines being built to any site with the promise of traffic,

the great development of branch and shunt lines, the transference of products from one line to another without handling, the great development of the through-freight, and the concentration and high development of terminals at the most convenient locations. There are certain other advantages which the railroads have assumed through an unjust use of power which count against the river traffic, but which does not in the long run benefit the nation at large. These have been pointed out (G, 7) to be:

1. The power of the railroads to charge lower rates between points where there is competition by water routes and to make this up on lines devoid of competition. For example, Clarksdale, inland, is 76.7 miles, and Friars Point, on the Mississippi River, is 70.1 miles from Memphis. The charge on first-class merchandise per hundred pounds from Clarksdale was fifty-six cents; from Friars Point to Memphis, forty-five cents. The former town is 379 miles from New Orleans, and the latter 385.5 miles. The rate from Clarksdale to New Orleans was seventy-two cents; from Friars Point to the same city, forty-five cents, and on the former line the charge on cotton was \$2.25 per bale, on the latter, \$1.00.*

It is asserted (A, 316) that while there has been a decline in the traffic of most commodities on the Mississippi River due to railroad competition, the shipment of lumber and coal has not suffered because the rate by boat is so cheap, as, for instance, coal from Pittsburg to New Orleans at a cost of less than two dollars per ton, or less than one mill per ton-mile, that the railroads cannot compete. It is quite generally the case that rates by water are lower than rates by rail, as, for instance, the rate in cents per hundred pounds from Pittsburg to Cincinnati by rail is 41 and by water 25 (A, 115). For the shipper, however, the rates are nearly equalized, because in water traffic there must be added the cost of insurance, as well as the extra charge of cartage.

2. The power of the railroads to buy steamboat lines, to force into bankruptcy competitive river lines by discriminating tariffs to monopolize wharf privileges, to block shipments by adverse placements of tracks and to run competitive lines of steamers. The extent of occupancy and ownership of water frontage on the Ohio and Mississippi rivers along the line of the greatest traffic of the system has been given for Pittsburg, Cairo and Memphis. J. C. Welliver writes (A, 388) that if the Ohio had been a German river, "The State would maintain that instead of building railroads to handle traffic which would as well be moved by river, it would

* *Cong. Record*, 41, 2,427. 1907.

better leave this traffic to the river and spend its money building railroads in regions where it was impossible to furnish any but rail transportation."

3. The power of railroads to prevent partial transportation by water by the refusal to pro-rate. There is no doubt that if the railroads and steamship lines could be made to coöperate and could be hindered from competing, our waterway transportation problem would be another story. Numerous instances may be cited. It is reported (A, 330) that the steamship lines on the Ohio had pro-rating agreements with all railroad lines approaching the river. In 1900 these arrangements were terminated by the representative of the railroads. "Instead of being able to quote through rates as formerly, the packet lines are now obliged to quote their own rate to the point where they connect with the railroad, and then add the local tariff rate of the railroad from that point to destination" (A, 331). This loss of pro-rating agreements is supposed to have resulted from the undue influence of certain large corporations, and it has ruined the water traffic in such staples as are produced by these monopolies. On the other hand, a recent decision of the International Commerce Commission (B, I, 333) seems to infer that the Commission has the power to compel railroads to pro-rate with a steamboat line.

G. The burdens of insurance, wharfage charges, etc. Marine insurance affects shipping in two ways: there is the necessity of insurance of the vessel itself which is assumed by the company and the necessity of insurance of the merchandise which is assumed by the shipper. In the former case the rate is high because of the greater liability and because at a single time a great part of a steamship company's equipment is under the stress of danger and the loss of a single vessel may mean the failure of the company. In comparison with the railroads of the United States, which, during 1906, suffered a loss of only 1.3 per cent. of the total freight revenue, so small that it is covered by the operating expenses, the steamship companies are severely handicapped. And, furthermore, because shippers are obliged to insure their own bill of goods, the companies must make lower rates than the railroads in order to attract trade; thus the cost of insurance must be added to the freight rate in order to get the exact cost of transportation. From Vicksburg to New Orleans the freight rate on cotton is seventy cents per bale and the insurance is twenty cents, making a total cost of ninety-five cents.

Besides the premiums for insurance, many boats along the river

have to pay terminal charges, such as dock rent, if the wharf is used, wharfage rent, and sometimes towage and pilotage costs. The wharfage charges are frequently so high as to discourage navigation. One river boat on the Ohio paid over \$3,200 for landing charges, which was one-fourth the net profits of the boat (B, II, 35). The result is that the boats refuse to stop at certain points, and the traffic is turned over to the railroads. These charges are in the main intended to cover the cost of maintenance, but in many places the depreciation of the property is evident, and the charges approach the character of "hold-ups." When the charges for landing at public wharves equals or excels the entire amount of the freight rate received from the landing, as is frequently the case, there is no encouragement to vessel owners to receive small consignments, and package freight must disappear from the river.

The waterway problem has assumed large proportions. In the volumes reviewed there is much material not pertinent for printing in this place, but which is interesting and valuable. The question of power and water privileges from certain slack-water projects are considered at great length. That some of the recommendations contained within these volumes will be fought is indicated in the brief discussion of the Rivers and Harbors Appropriation Bill of this Sixty-first Congress, Third Session, when a member, speaking for the Lakes to the Gulf Deep Waterways Association, states that "The purpose of that convention (St. Louis) was to call the attention of Congress to the growing necessity of a 14-foot channel from the Lakes to the Gulf, and the convention went on record in its resolutions demanding that no less than 14 feet should be permitted and should be accepted,"* and caused to be read in Congress portions of these resolutions.

The subject has become an intricate one; it is pioneering into the unknown with little aid from the analogies drawn from other lands; but one can find encouragement, in the face of so much insistence from Boards of Trade and Waterway organizations, that the Committee of the Senate and House of Representatives advises that without a careful and unbiased examination of proposed improvements of the nature now required by statute no project should be adopted by Congress.

* *Cong. Record*, 46. 178. Dec. 1910.

THE DISCOVERER OF THE PHILIPPINES

BY

JOHN DENISON CHAMPLIN

It is remarkable that neither of the two great navigators who endowed Spain with her colonial possessions was a Spaniard; Columbus, who "gave to Castile and Leon a new world," was a Genoese; Magellan, the discoverer of the Philippines, was a Portuguese. Magellan, who ranks second only to Columbus as a navigator and discoverer, was actuated, in undertaking his long voyage across the Pacific, by the same motive which induced the great Genoese to brave the terrors of the "immeasurable sea of darkness," as the Arabian geographers termed the Atlantic—that of reaching the spice countries of the East by sailing westward.

The spice trade of southern Asia had long been a source of wealth to the European nations that controlled it. Under the Roman Empire the chief route of this trade was by way of the Red Sea. Once a year, in June or July, a fleet of a hundred and twenty ships sailed from Myos Hormos, a port of Egypt, for the coast of India and the island of Taprobane (Ceylon), where the merchants of the East congregated to exchange their commodities, chiefly pepper and spices, for the wines and the silver, tin and lead of the West. The fleet returned in December or January to Myos Hormos, whence the products of the voyage were transported on camels to the Nile and down that river by boat to Alexandria, then the chief distributing point for the western world.

After the rise of Islam, this trade, which in the East was wholly in the hands of the Mohammedans, sought the West through two principal channels, the ancient southern route by the Red Sea, and a northern one through the Black and Caspian Seas, and by camel-caravans beyond. After the Crusades the southern route was controlled by the Venetians, the northern one by the Genoese. The irruptions of the Tartars and the fall of Constantinople broke up the eastern trade of Genoa and reduced her to the brink of ruin. Out of her troubles arose the idea that the countries of the East could be reached by sailing westward across the Atlantic, the spice trade redeemed from Mohammedan control, and Genoa's commercial supremacy restored. Columbus, one of those who entertained this

idea, died in the belief that he had reached the Indies. But the discoveries of Columbus and his successors led to results far different from those anticipated: maritime power left the Mediterranean for the coast of the Atlantic, and Spain and Portugal succeeded to the commercial and naval greatness of Genoa and Venice.

A short month after Columbus's solemn reception at Barcelona by the Court of Spain, after his return from his first voyage, Pope Alexander VI divided the undiscovered world between Spain and Portugal. The Grand Admiral had discovered, a hundred leagues west of the Azores, a line of non-magnetic variation, where the compass-needle pointed due north without deviation, and had come to the conclusion that this line was a fixed geographical boundary between the Eastern and Western Hemispheres. The Pope changed this physical meridian into a political one by making it the line of demarcation between the possessions of the two countries, limiting Spain to lands discovered to the west of this meridian and Portugal to those east of it. By the convention of Tordesilhas, signed June 7, 1494, Spain and Portugal agreed to remove Pope Alexander's line of demarcation between their respective possessions to a meridian 370 leagues west of the Cape Verde Islands.

Twelve years after Vasco Gama's voyage around the Cape of Good Hope had won for Portugal the trade of the Indies, the Portuguese entered the Indian Archipelago, and in 1512 an expedition sent out by Albuquerque discovered the Moluccas or Spice Islands, the chief object of the long search of both Portuguese and Spaniards. With this expedition went, perhaps, Fernando Magellan, or, in its Portuguese form, Fernan de Magalhães, a young naval officer who had accompanied Albuquerque to the Indies, though he is not mentioned by De Barros among those who took part in it. Whether he actually visited the Moluccas or not, he obtained at this time a knowledge of those islands which led afterwards to the great voyage that has won him a place among the world's famous discoverers.

Magellan returned to Portugal in 1513 and, after some service in Morocco, dissatisfied with his failure to receive the promotion which he considered his due, left the service of the King of Portugal and went to Spain, where he settled and married. The geographical position of the Moluccas was then in dispute, both Spain and Portugal claiming them as lying within its own division. In a letter written October 23, 1522, by Maximilianus Transylvanus, Secretary to the Emperor Charles V, to the Cardinal of Salzburg, we are told that Magellan "showed to Cæsar" that the "islands which they

call the Moluccas, in which all the spices are produced, and are thence exported to Malacca, lay within the Spanish western division, and that it was possible to sail there; and that spices could be brought thence to Spain more easily, and at less expense and cheaper, as they came direct from their native place." Charles, who had just been elected Emperor of the Holy Roman Empire, being a Fleming rather than a Spaniard, did not share the prejudices of his subjects against the Portuguese. He created Magellan a knight of St. James, entrusted him with a fleet of five ships to prove his claims, and advanced him a liberal sum for the maintenance of his family during his absence.

Magellan's fleet consisted of the *Trinidad*, the flag-ship, of 110 tons; the *San Antonio* of 125 tons; the *Concepcion* of 90 tons; the *Vittoria* of 85 tons, and the *Santiago* of 75 tons, manned by 237 men, including soldiers. Among the volunteers was Antonio Pigafetta, a native of Vicenza, Italy, who had gone to Spain in the suite of Monsignor Cheregato, Ambassador of Pope Leo X. He employed his leisure in keeping a journal of the events of the voyage, which was published after his return in an abridged form, first in French and later in Italian, but not in its entirety until 1800, when it was printed from the original manuscript in the Ambrosian Library, Milan. As Pigafetta's limited education is largely compensated by intelligent and quick perception, heightened by curiosity concerning the countries and peoples visited, his journal is intensely interesting.

The squadron set sail from San Lucar, Sept. 20., 1519, spent a week at Teneriffe, and cast anchor in the bay of Rio de Janeiro on the 13th of December. Following the coast southward in search of the inlet supposed to connect the Atlantic with the South Sea (*Mar del Sur*), as Balboa had named the western ocean, and after spending some time in the exploration of the Rio de la Plata, which he supposed to be that passage, Magellan reached, March 31, 1520, a harbor on the coast of Patagonia, which he named Port St. Julian, where he wintered. He suppressed there, in a summary manner characteristic of the age, a conspiracy against his life by the Spanish commanders of the ships, who hated him, says Pigafetta, because he was a Portuguese. Two were executed and their bodies quartered and set up on stakes on shore. A third, who had received his appointment directly from the Emperor, was pardoned, but was detected a few days later in a fresh conspiracy and was set ashore, together with a priest in complicity with him, and abandoned to the mercy of the Patagonian savages.

On Oct. 21, 1520, the fleet entered the strait separating the continent of America from Tierra del Fuego. It was Saint Ursula's day and Magellan, who was very religious so far as outward observance went, named the cape at its entrance in her honor the Cape of the Eleven Thousand Virgins. The strait itself was called Vittoria, after the ship which first entered it, but Magellan subsequently named it the Channel of All Saints. Later navigators, ignoring both these names, have chosen to call it after him who first navigated its waters. Some five weeks were occupied in exploring its channels, during which the *Santiago* was wrecked. The *San Antonio* soon after deserted and returned to Spain, where she arrived May 6, 1521, and spread false reports about Magellan. After a fruitless search for her, the remaining ships went on and on Nov. 28, 1520, Magellan weathered the Cape of Desire at the western entrance of the strait and entered upon the great western ocean to which he gave the name of Pacific (*Oceano Pacifico*), on account of the calmness of its waters as compared with the stormy Atlantic.

The hardships endured during the many days before they again saw land—a voyage more than three times as long as that of Columbus from the Canaries to Guanahani—the disheartenment of the crews reduced almost to starvation, and the indomitable energy and perseverance of Magellan, unequalled save by that of the great Genoese, are graphically narrated by Pigafetta. We “entered into the Pacific Sea, where we remained three months and twenty days without taking in provisions or other refreshments, and we only ate old biscuit reduced to powder, and full of grubs, and stinking from the dirt which the rats had made on it when eating the good biscuit, and we drank water that was yellow and stinking. We also ate the ox-hides which were under the main-yard so that the yard should not break the rigging, and they were very hard on account of the sun, rain and wind, and we left them for four or five days in the sea, and then put them a little on the embers, and so ate them; also the sawdust of wood, and rats which cost half a crown each, moreover, enough of them were not to be got.”

Mistaking the position of the Moluccas, Magellan sailed northward to about the thirtieth parallel, after which he pursued a north-westerly course across the equator to about ten north latitude, when he changed his course to the west. He saw no land, excepting two sterile islets until he reached the archipelago of volcanic islands, now called the Marianas or Ladrone Islands, where he cast anchor on March 6, 1521. “The captain-general wished to touch at the largest of these islands to get refreshments of provisions; but it was

not possible because the people of these islands entered into the ships and robbed us, in such a way that it was impossible to preserve oneself from them. Whilst we were striking and lowering the sails to go ashore, they stole away with much address and diligence the small boat called the skiff, which was made fast to the poop of the captain's ship, at which he was much irritated, and went on shore with forty armed men, burned forty or fifty houses, with several small boats, and killed seven men of the island; they recovered their skiff. * * * Immediately after we sailed from that island, following our course, and those people seeing that we were going away, followed us for a league with a hundred small boats or more, and they approached our ships, showing to us fish, and feigning to give it to us. But they threw stones at us and then ran away, and in their flight they passed with their little boats between the boat which is towed at the poop and the ship going under full sail; but they did this so quickly and with such skill that it was a wonder."

Magellan, disgusted with his reception, named the group *Islas de los Ladrones* or *Isles of Thieves*. They were taken possession of for the crown of Spain, forty-four years later, by Miguel de Legaspé, the conqueror of the Philippines, and their name was changed subsequently to *Marianas*, in honor of Maria Anna of Austria, queen of Philip IV. They now constitute a province of the Philippines, the seat of government being at Guam, the largest island.

Ten days later, on Passion Sunday, March 16, 1521, Magellan, still in search of the Moluccas, came in sight of Samar, the most easterly of the central group of the Philippines, and was thus the first European to look upon that famous group, though they had long been known to the Malays, Javanese, Chinese and Japanese, whose ships had visited them for centuries. "In this place," writes Pigafetta, "there were many circumjacent islands, on which account we named it the Archipelago of Saint Lazarus (*San Lázaro*), because we stayed there on the day and feast of Saint Lazarus. This region and archipelago is in ten degrees north latitude, and a hundred and sixty-one degrees longitude from the line of demarcation." The islands retained this name until 1542, when Ruy Lopez de Villabolas, leader of an unsuccessful expedition from Mexico to colonize them, renamed them the Philippines in honor of Philip, Prince of the Asturias, who succeeded his father, the Emperor Charles V, in 1556, as Philip II. Magellan saw but little of the archipelago. Passing through the strait of Surigao, he reached, on March 28th, the little island of Limasagua, called by Pigafetta Mazzava, where he received a friendly reception by the "king" and his subjects. Thence

he sailed northwest between Leyte and Bohol, and on Sunday, April 7, entered the harbor of Cebu in the island of Cebu, the Zzubu of Pigafetta.

On approaching the principal village, Magellan ordered all his ships to hang out their flags and to fire their artillery. Having come to anchor, he sent a young man and his interpreter ashore. They found the king and a great number of people assembled, all alarmed by the artillery. The interpreter calmed their fears by telling them that the guns had been fired in honor of their king. The king, reassured, asked "what we were seeking. The interpreter answered him that his master was captain of the greatest king in the world, and that he was going by the command of the said sovereign to discover the Molucca islands. However, on account of what he had heard where he had passed, and especially from the King of Mazzava, of his country and good fame, he had wished to visit him, and also to obtain some refreshments and victuals for his merchandize. The king answered that he was welcome, but that the custom was that all ships that arrived at his country or port paid tribute, and it was only four days since that a ship called the Junk of Ciama [Siam], laden with gold and slaves, had paid him his tribute, and to verify what he said, he showed them a merchant of the said Ciama, who had remained there to trade with the gold and slaves."

The interpreter told the king that his captain would not pay tribute to any sovereign in the world; and that if he wished for peace he should have peace, and if he wished for war he should have war. The Ciama merchant then said to the king in his own language: "Look well, oh king, what you will do, for these people are of those who have conquered Calicut, Malacca, and all greater India; if you entertain them well and treat them well you will find yourself the better for it, and if ill, it will be so much the worse for you, as they have done at Calicut and Malacca. The interpreter, who had understood all this discourse, said to them that the king, his master, was a good deal more powerful in ships and by land than the king of Portugal, and declared to him that he was the King of Spain and Emperor of all Christendom, wherefore, if he would not be his friend and treat his subjects well, he would another time send against him as many men as to destroy him. Then the king answered that he would speak to his council, and give an answer the next day."

On the next day the king, assured that the Spaniards only wished to trade, "said that he was content, and as a greater sign of affection sent him [Magellan] a little of his blood from his right arm, and

wished he should do the like." A delegation from the king, consisting of his nephew and some principal men, visited the ship and were received with much ceremony, Magellan "sitting in a chair of red velvet and the principal men of the ships near him in leather chairs and the others on the ground on mats." Magellan made the visitors a long address on the subject of peace, and told them of the advantages that would accrue to them if they became Christians. His hearers seem to have been impressed by Magellan's eloquence, and answered that "they wished first to speak to their king, and then would become Christians. Each of us wept for the joy which we felt at the good-will of these people," * * * who "all cried out with one voice, that they did not wish to become Christians from fear, nor from complaisance, but of their free will."

The king having sent to Magellan a present of baskets full of rice, pigs, goats and fowls, the latter despatched Pigafetta and another with return presents—"a robe of yellow and violet silk in the fashion of a Turkish jubbeh, a red cap, very fine, and certain pieces of glass, and had all of them put in a silver dish, and two gilt glasses. When we came to the town we found the king of Zzubu at his palace, sitting on the ground on a mat made of palm, with many people about him. He was quite naked, except that he had a cloth round his middle, and a loose wrapper round his head, worked with silk by the needle. He had a very heavy chain round his neck, and two gold rings hung in his ears with precious stones. He was a small and fat man, and his face was painted with fire in different ways. He was eating on the ground on another palm mat, and was then eating tortoise eggs in two china dishes, and he had four vessels full of palm wine, which he drank with a cane pipe."

Magellan sent a quantity of merchandise on shore, with four men to dispose of it, and the king gave them a house to display it in. "These people live with justice, and good weight and measure, loving peace, and are people who love ease and pleasure. They have wooden scales for weighing their merchandise. Their houses are made of wood and beams and canes, founded on piles, and are very high, and must be entered by means of ladders; their rooms are like ours, and underneath they keep their cattle, such as pigs, goats and fowls."

The king having finally promised to become a Christian, great preparations were made for the baptismal ceremony. A scaffolding was erected in the open space of the village, and decorated with tapestry and palm branches. "On Sunday morning, the fourteenth day of April, we went on shore, forty men, of whom two were

armed, who marched before us, following the standard of our king emperor. When we landed, the ships discharged all their artillery, and from fear of it the people ran away in all directions. The captain and the king embraced one another, and then joyously we went near the scaffolding, where the captain and the king sat on two chairs, one covered with red, the other with violet velvet. The principal men sat on cushions, and others on mats, after the fashion of the country. Then the captain began to speak to the king through the interpreter to incite him to the faith of Jesus Christ, and told him that if he wished to be a good Christian, he must burn all the idols of his country, and, instead of them, place a cross, and that everyone should worship it every day on their knees, and their hands joined to heaven; and he showed him how he ought every day to make the sign of the cross. To that the king and all his people answered that they would obey the commands of the captain and do all that he told them. The captain took the king by the hand and they walked about on the scaffolding, and when he was baptised he said that he would name him Don Carlos, as the emperor his sovereign was named; and he named the prince Don Fernand, after the brother of the emperor, and the king of Mazzava Jehan, and to the others each a name of his fancy. Thus, before mass, there were fifty men baptized."

"After dinner our chaplain and some of us went on shore to baptise the queen. She came with forty ladies, and we conducted them on to the scaffolding; then made her sit down on a cushion and her women around her, until the priest was ready. During that time they showed her an image of our Lady, of wood, holding her little child, which was very well made, and a cross. When she saw it she had a greater desire to be a Christian, and, asking for baptism, she was baptized and named Jehanne, like the mother of the emperor. The wife of the prince, daughter of this queen, had the name of Catherine, the Queen of Mazzava, Isabella, and the others each their name. That day we baptized eight hundred persons of men, women and children. The queen was young and handsome, covered with a black and white sheet; she had the mouth and nails very red, and wore on her head a large hat made of leaves of palm, with a crown over it made of the same leaves, like that of the Pope. After that she begged us to give her the little wooden boy to place in the place of the idols. This we did, and she went away."

"At last, in eight days, all the inhabitants of this island were baptized, and some belonging to the neighboring islands. * * * * The captain-general went ashore every day to hear mass, to which

there came many of the new Christians, to whom he explained various points of our religion. One day the queen came with all her state. She was preceded by three damsels, who carried in their hands three of her hats; she was dressed in black and white, with a large silk veil with gold stripes, which covered her head and shoulders. Very many women followed her, with their heads covered with a small veil, and a hat above that; the rest of their bodies and feet were naked, except a small wrapper of palm cloth which covered their natural parts. Their hair fell flowing over their shoulders. The queen, after making a bow to the altar, sat upon a cushion of embroidered silk, and the captain sprinkled over her and over some of her ladies rose water and musk, a perfume which pleases the ladies of this country very much. The captain on that occasion approved of the gift which I had made to the queen of the image of the Infant Jesus, and recommended her to put it in the place of her idols, because it was a remembrance of the Son of God. She promised to do all this and to keep it with much care.”*

Magellan, inspired by his success in Cebu, determined to follow it up by planting the cross in other islands. East of Cebu and separated from it by only a narrow strait, lies the little island of Mactan, the Matan of Pigafetta, which was ruled by two chiefs. One of these had expressed his willingness to accept Christianity, but had been restrained by the other. Magellan determined, against the advice of his friends, to punish the recalcitrant in person, and set out, on the night of April 26, with sixty Spaniards and a few native auxiliaries, in three boats. The king of Cebu and many of his chief men followed in their own boats, invited to see how Spaniards could fight. Magellan waited for daylight before landing. The water was shallow and the men were obliged to wade knee-deep a long distance, at least two bow-shots, says Pigafetta. Leaving eleven men to guard the boats, Magellan led the remainder to the shore, where he was met by a large body of natives, reckoned by Pigafetta at fifteen hundred, drawn up in three divisions, armed with bows and arrows, scimitars and bamboo lances with points hardened in the fire. The Spaniards who, protected by corselets and helmets, despised the native weapons, attacked this large force with ardor, but met with a stubborn resistance. Their ammunition was soon exhausted and Magellan, recognizing too late the danger of the situation, ordered a retreat. The islanders, elated at their

* This image, long worshiped as an idol, was recovered forty four years later, when Miguel de Legaspé returned to Cebu with missionaries, and is said to be still preserved there in the Church of San Augustine, called also the Church of the Holy Infant of Cebu, together with the cross erected by Magellan.

advantage, pressed the Spaniards in front and on both flanks, and the retreat became a rout. Magellan, with a few of the bravest, attempted to stem the tide, but was cut off from the rest and surrounded, and after a gallant resistance, was killed with eight of his companions and four friendly natives. Pigafetta was wounded, but was among those who escaped and lived to narrate the mournful tale. He says:

"The captain had his right leg pierced by a poisoned arrow, on which account he gave orders to retreat by degrees; but almost all our men took to precipitate flight, so that there remained hardly six or eight of us with him. We were oppressed by the lances and stones which the enemy hurled at us, and we could make no more resistance. * * * As they knew the captain, they aimed especially at him, and twice they knocked the helmet off his head. He, with a few of us, like a good knight, remained at his post without choosing to retreat further. Thus we fought for more than an hour, until an Indian succeeded in thrusting a cane lance into the captain's face. He then, being irritated, pierced the Indian's breast with his lance, and left it in his body, and trying to draw his sword he was unable to draw it more than half way, on account of a javelin wound which he had received in the right arm. The enemies seeing this, all rushed against him, and one of them with a great sword, like a great scimeter, gave him a blow on the left leg, which brought the captain down on his face, then the Indians threw themselves upon him, and ran him through with lances and scimeters, and all the other arms which they had, so that they deprived of life our mirror, light, comfort, and true guide. Whilst the Indians were thus overpowering him, several times he turned round towards us to see if we were all in safety, as though his obstinate fight had no other object than to give an opportunity for the retreat of his men. We, who fought to extremity and were covered with wounds, seeing that he was dead, proceeded to the boats, which were on the point of going away."

Magellan's sad fate throws a considerable light on his character, and shows that though he possessed many of the qualities of a great captain, his bravery was marred by rashness and his judgment impaired by credulity. The sequel proves that he was no match in cunning for the king of Cebu. As soon as that breechless potentate, who had watched the fight from a safe distance in his boat, saw that the commander of the Spaniards had fallen before the weapons of the islanders, he forgot his Christian professions, and began to plot how he could rid himself of the remainder of his

unwelcome guests. A few days after the return to Cebu, he invited Barbosa and Juan de Serrano, who had succeeded to the command, and others, to a great feast and deliberately murdered twenty-six of his newly-made brethren. After this sad experience, the Spaniards, now greatly reduced in numbers, went to the island of Bohol, southeast of Mactan, where they transferred the equipment of the Concepcion to the other ships and burned her. Under the command of Juan Sebastian del Cano, they then set sail again for the Moluccas and, after a visit to Borneo, finally reached Tidore, one of the spice islands. There they loaded both vessels with cloves and, fearful of the Portuguese, who had already laid claim to the islands, they sailed, the *Trinidad* for Panama and the *Vittoria* for Spain. The former never reached her destination, but the latter, after a stormy voyage around the Cape of Good Hope and the loss of thirteen of her men, captured by the Portuguese at the Cape Verde Islands, arrived with only eighteen men on board at San Lucar, whence she had sailed just three years before. The *Vittoria*, whose representation on the seal of the Hakluyt Society is so familiar, was thus the first ship to sail around the earth. The Emperor, in commemoration of the event, gave to Sebastian del Cano, her commander, for his armorial bearings, a terrestrial globe, with the grand motto "*Primus me circumdedisti.*" But as Magellan had previously sailed around the Cape of Good Hope to the Asiatic Archipelago, and had in his voyage westward reached nearly the same point, the world has universally given to him, the discoverer of the Philippines, the credit of being the first to circumnavigate the globe.

NOTES ON THE DESCRIPTION OF LAND FORMS.—V.

THE PLACE OF DEDUCTION IN THE DESCRIPTION OF LAND FORMS. It would appear from certain reviews in European geographical journals that there is an impression abroad to the effect that the use of deduction in geographical studies, particularly in relation to land forms, is an American innovation. If this were really the case, it would be highly complimentary to American and by no means flattering to European geographers; for inasmuch as the explanatory or evolutionary treatment of land forms is coming in these modern days to be more and more generally adopted as superior to any other means of treatment yet devised, and inasmuch as deduction is an essential process in determining the truth about the evolution of existing forms from earlier forms, it follows that the modern treatment of land forms cannot be successfully accomplished if deduction is ruled out. But it is by no means true that European geographers have neglected this important mental process. A good number of examples, some of which are briefly instanced below, might be cited to show a highly profitable use of deduction by well-known geographers of the Old World. Nevertheless, if international comparisons are to be indulged in, it may be admitted that deduction has been used less carefully and thoroughly, less consciously and intentionally, by many European geographers than by some American; and to just that extent is European treatment of land forms in danger of lagging behind American treatment.

But there is another aspect of this question which is often misapprehended by those European writers who do not consciously and habitually give deduction its merited place in their own studies. It seems sometimes, when along with other mental processes such as invention and comparison, deduction is given proper rank, that the European reviewer finds the importance thus assigned to deduction is much higher than that which it receives in his own studies, and he therefore names the whole method of investigation after this, to him, striking element. It would be more logical to name such a method of investigation the analytical method, since its essential quality is the close analysis of various possible solutions, and since in such analysis deduction is, as above noted, only one of the several mental processes that holds a necessary place. Again, it seems as if reviewers have sometimes assumed that the investigation of a geographical problem must have been largely deductive, because a deductive order of statement is employed in the presentation of the results; but this is by no means necessarily the case. The deductive method of presentation is so effective as a means of stating the results of an investigation to mature readers, that it may

be advantageously employed even if the results were reached largely by induction. It surely happens often enough that an observer, who has not had much occasion to employ deductive methods until after he has gained an abundant store of facts by outdoor observation, may nevertheless prefer to open the statement of his final results by announcing them as deductions from the general principles that he has established in good part by induction; and he may only on a later page substantiate his deductions by adducing appropriate examples of actual occurrence.

A sufficient reason for the choice of the deductive method of presentation for mature readers is that it is more concise and more easily understood than any other explanatory method. It is therefore desirable to distinguish between deduction employed as a method of exposition and deduction employed as a means of investigation; and furthermore to recognize that deduction, skilfully employed, aids in giving the valuable quality of clearness to exposition, just as deduction appropriately applied and guarded, aids in giving the invaluable quality of safety to an investigation. Whether deduction characterized the process of investigation as well as that of presentation in the following examples from German sources, cannot be immediately determined; but wherever it entered the treatment of the problems under discussion, it was evidently a helpful and powerful aid to the other mental faculties that were employed.

One of the most famous European examples of the use of deduction is that by v. Richthofen on the production of *Abrasionsflächen*, first presented in connection with his observations in China in 1870; afterwards in his "Führer für Forschungsreisende" (Berlin, 1886, 353-364), in which this highly esteemed geographer independently reproduced the deductive discussion regarding plains of marine denudation which Ramsay had given about twenty years before (Denudation of South Wales. *Mem. Geol. Surv. Gr. Britain*, i, 1846). Both of these able and original thinkers surely had abundant facts, geological and geographical, in mind; yet both employed a largely deductive method in setting forth the consequences of the hypothesis of marine planation. Neither of them, however, considered the alternative hypothesis of normal subaerial planation; neither of them therefore could substantiate their conclusions by showing that the plains, which they regarded as of marine origin, had all the appropriate features which such plains ought to have, and none of the particular features which plains of normal planation ought to have. But in this respect Ramsay and v. Richthofen were like some of their successors who, in discussing the possibility of normal planation with respect to the general baselevel of the ocean, overlooked the possibility of arid plantation independent of the ocean as baselevel, until this important theoretical consideration was introduced by Passarge. Evidently then the danger involved in the explanatory description of land forms does not lie so much in the use of hypothesis and deduction as aids in reaching explanation, as it does in the failure to employ invention of

hypotheses and deduction of consequences actively and thoroughly enough to rule out the chance of error. If there is any one lesson regarding the use of deduction that is to be drawn from the work of pathfinders like Ramsay and v. Richthofen regarding the genetic treatment of land forms, it is that deduction ought to be employed even more thoroughly and freely than they employed it.

A careful and conscious use of deduction is seen in Philippon's "Beitrag zur Erosionstheorie" (*Pet. Mitt.*, xxxii, 1886, 67-79), in which a conscious effort is made to study out deductively the nature of the slope to which a river valley will be reduced by indefinitely long-continued, uninterrupted erosion, and from which concrete cases are intentionally excluded in order to give sufficient place for theoretical considerations. Philippon here wisely examines so artificial a case as that of a smoothly sloping land surface of uniform structure, that is supposed to have been suddenly laid bare from the sea (76), and proceeds to deduce the changes that it will suffer under the action of consequent streams (although he does not call them by this handy name); and he is fully justified in doing so, because this simplified ideal case serves him as an excellent beginning from which more complicated natural cases are afterwards approached. The importance of weathering, creeping, and washing of soil in the reduction of interstream areas to faint relief in the late stage of an uninterrupted normal cycle of erosion is, however, underrated, and the importance of the lateral swinging of rivers in the production of subaerial plains is somewhat exaggerated in other writings of this author; but on the other hand Philippon has elsewhere briefly presented an extremely valuable deductive view ("Zur Morphologie des Rheinischen Schiefergebirges," *Verhandl. XIV. deut. Geogr'ntages*, 1903, 193-205. V. p. 199-) as to the possible dissection of a normal peneplain without its being elevated from the position in which it was formed; for inasmuch as a peneplain a thousand miles or more inland from the ocean must stand at a significant altitude above sea level, its rivers will be revived and its surface will be sharply dissected by the revived rivers, if the region between the peneplain and the ocean is depressed, all the better if the intermediate region is submerged so as to bring the shore line against the fault scrap or monoclinical slope by which the undisturbed peneplain is then bordered. This important principle has not been sufficiently recognized by those American geographers who, following the brief hints of Marvin (U. S. Geol. and Geogr. Surv. Territories, *Ann. Rep.* for 1873, 1874, 144) and the fuller discussions by Powell ("Exploration of the Colorado River of the West," Washington, 1875, 212), have deductively developed the conditions under which peneplains should be formed, and who have universally regarded the dissection of a peneplain as proof of its elevation. An application of Philippon's principle may be found in articles by Cvijić on peneplains in the Carpathians ("Entwicklungsgeschichte des Eisernen Tors. *Pet. Mitt., Ergänzhft.* 160, 1908; v, p. 52-; Also:—"Peneplains und epirogenetische Bewegungen der Sudkarpathen. *Pet. Mitt.*, liv, 1908, 114-116);

but neither Philippson nor Cvijić has deducted or otherwise indicated means of determining the share that the possible elevation of the peneplains themselves may have had, when conjoined with the depression of seaward lands, in causing dissection. Deduction of special consequences for each of these possibilities is therefore still to be desired.

No more striking example of the value of deductive treatment in a geographical problem can be found than that afforded by Passarge's brief discussion of *Rumpflächen und Inselberge* (*Zeitschr. deut. geol. Gesellsch.* lvi, 1904, *Protokoll* 193-209. See also:—"Die Inselberglandschaften im tropischen Afrika." *Naturwiss. Wochenschr.*, iii, 1904, 657-665). Here for the first time is clearly set forth the remarkable possibility—strangely overlooked by previous students—that a desert region of interior drainage may be reduced to a plain, truncating all manner of structures indifferently, by the combined action of arid weathering, winds, and occasional rains; and that the plain will stand at no definite altitude in relation to sea level. True, the conditions demanded for the realization of extensive desert levelling are peculiar, and probably exceptional in the earth's history; for they include the persistence of an arid climate over a very large continental mass which must stand undisturbed for geological ages. Nevertheless, Passarge's deduction of his consequences from his premises seems to be correct, whether his actual examples in South Africa are correctly interpreted or not. His use of deduction is made manifest by such phrases as:—"Nehmen wir also an," . . . "*Voraussetzung ist, dass*" . . . and "*Welches wären voraussichtlich die Folgen gewesen?*", as well as by the repeated use of the auxiliary verb, *müssen*, which has no place in the record of observational studies. Of course, arid planation may also take place with respect to the normal baselevel of the ocean in desert regions which slope to the sea; but even if some or all of the arid plateaus of Africa should eventually prove to be of such lowly origin, afterwards uplifted, instead of having been produced as interior plains at their present altitude, as Passarge supposes, the value of his deductions regarding the general processes and results of arid planation must hold good. Indeed, in view of their great success and importance, one must wish that he, an experienced explorer of desert regions, had himself more fully deduced and explicitly stated the expectable earlier stages of the arid cycle in their orderly progress toward arid planation, and that he had not left to a geographer of less experience in the observational study of desert lands the deductive elaboration of the youthful stage of many independent basins of centripetal drainage and central aggradation; of the early mature stage of integrated drainage, in which the higher independent basins of youth come to be tributary to a main lower basin where heavy aggradation takes place; of the late mature stage in which exportation of dust by the winds degrades the main basin faster than it is aggraded by inwashed waste; and of the stage of old age, in which even the main basin of heaviest aggradation has been swept

clean, and a flat rock floor developed far and wide, here and there veneered with a thin wash of gravel and sand, or interrupted by surviving Inselberge.

MOUNTAIN PASSES. Studien über Gebirgspässe mit besonderer Berücksichtigung der Ostalpen. Versuch einer Klassifikation. Von Dr. Johann Sölch. (*Forsch. z. deut. Landes-und Volkskunde, Stuttgart*, xvii, 1905, 119-273). This comprehensive essay forms an excellent example of the intentional and careful use of the deductive method for the presentation of the results of a geographical investigation. There is internal evidence that the accumulation of observed facts and the formation of induced generalizations accompanied, if they did not precede, the deduction of a systematic sequence of ideal examples: but to repeat in a published essay the necessarily irregular progress of an investigation, with many alternations between induction and deduction, would be an extremely ineffective method of acquainting the reader with the results reached by the writer. A deductive order of statement was therefore advisedly chosen; but it is accompanied and followed by the citation of many facts of actual occurrence, by means of which the correctness of the deductions is fortified.

The essay opens with a well-considered chapter (127-135) on the concepts implied by the term, pass, which shows that it may be employed simply to denote an element of form, a mere notch in a mountain crest never traversed by human foot, as well as in the more special anthropogeographical sense of a depression in a mountain range through which a single path or road connects a number of roads that converge toward the mountain base from the lower lands on either side. The second chapter (136-145) gives an empirical statement of the morphology of mountain passes: in the opinion of the reviewer this might have been well replaced by an explanatory summary at the end of the essay. Then comes the main body of the work, a discussion of the origin and development of mountain passes, in which deduction occupies an advantageously prominent place. A special section is given to a consideration so abstract as "die konstruktiven Gebirgspässe" (146-152), in which the effects of deforming a smooth surface by folding and faulting are elaborately set forth. A definite preparation is thus made for two following sections on "die fluviatilen Destruktionspässe" (153-195) and "die glazialen Destruktionspässe" (194-263). In the first of these two sections special attention is given to the gradual modification of constructional or initial passes by the action of ordinary or normal destructive processes, including weathering and creep as well as stream erosion; farther on, the relation of passes to the erosion of unsymmetrical divides, and to various kinds of river captures, is elaborately deduced (162-), the progressive change of form with the advance in an imaginary cycle of erosion being systematically set forth. Under the second heading, the importance of glacial erosion in deepening pre-existing notches and in producing new ones is explained with much detail. Notches in the back wall of enlarged cirques (Karpässe, 195) belong here; as do also those broad, flat-floored trough passes ("glaziale

Transfluenz-pässe," 206), produced by heavy glaciers that overflowed preglacial divides and wore them down to more open form. Preglacial notches that have been deepened by the overflow of glacial distributaries ("glaziale Diffluenz-pässe," 243) are also shown to be of importance. Numerous examples are cited, chiefly from the Alps. Had Sölch's essay had better page headings and paragraph headings, its abundant material would have been more easily read; and had it been illustrated by simple diagrams of type forms, its value would have been greatly increased.

TERRACES IN SOUTH-CENTRAL ITALY. A. Galdieri. *Le terrazze orografiche dell' alto Picentino a nord-est di Salerno*. (Boll. Soc. Geogr. Ital., xxix, 1910, 37-116). The author of this welcome contribution to the geography of Italy is a member of the Geographical Institute of the University of Naples. He opens his essay by saying that, as here for the first time a group of river terraces in southern Italy is illustrated, it appears desirable to depart somewhat from the usual method of scientific presentation—[whatever that may be]—and to make his account as elementary as possible, avoiding overabundant technical terms of difficult meaning. He therefore devotes a few introductory lines to recalling the familiar principles regarding the tendency of water to wear down the lands, and adds a brief explanation of the origin of terraces by the lowering of a river level, whereby the remnants of its former valley floor remain as lateral benches, which as erosion progresses become more extensively eroded and less easily recognizable. He then devotes 15 pages to the narrative and inductive description, with half-tone illustrations, of a series of rock benches, overlaid by heavy gravel beds, 50-75 m. in thickness, which now stand above the valley bottom of the upper Picentino, rising up stream from 220 to 250 m., and with much patience demonstrates that they are indeed terraces of the kind indicated at the opening of his essay. Six more pages are next given to the inductive demonstration of the existence of a still higher and more dissected group of gravel-covered terraces; and after this, "without further delay in other minute observations and superfluous demonstrations," brief mention is made of a narrow and discontinuous terrace at a much lower level than the first one mentioned. Not until the 23d page of the essay does the reader find a simple cross-section, on which the relative position of the three groups of terraces is concisely figured. Had this simple diagram been placed at the beginning, and had the items of fact been presented as related to the middle, the uppermost, and the lowest terrace, the reader would have been greatly aided in acquiring the writer's meaning. Still further aid would have been given if, following the introductory use of the diagram—and following also, if desired, an explanatory exposition of a simple deductive scheme, whereby terraces at successively lower levels and of less breadth may be produced—explicit statement had been made that the uppermost terrace consists only of much dissected lateral remnants of a wide-floored, late mature valley, above which the un-

terraced mountains rise in subdued forms; that the middle terrace represents a deeper valley which was somewhat less maturely widened; while the narrow strips of the lowest terrace indicate a still deeper valley which was only sub-maturely opened; and the present valley, incised beneath the lowest terrace, is comparatively young. Unfortunately this simple generalization is not explicitly announced, although it is graphically shown in the helpful but belated cross-section.

The omission of so illuminating a generalization can hardly be because its terminology is too difficult for the readers to whom the essay is addressed, but rather because of the habitual diffidence of European writers regarding the use of generalized or deductive phrases for the prompt presentation of their results at the beginning of their essays. Deduction is, however, abundantly used in the later pages of the essay, when, after showing that terraces similar to those of the upper Picentino occur in neighboring valleys, the origin of the terraces is discussed in some detail. The effects of land movements, of depression of sea level, and of change of climate are considered; the consequences of each possibility are determined deductively, and the success of each supposition is measured by the degree of accordance shown when its consequences are confronted with the appropriate facts. Evidently, then, as far as this essay represents an approved European method of presentation, deduction is an essential element in it, but this indispensable mental process is used chiefly in discussion after exposition has been completed, rather than as an aid in exposition itself.

As to the results gained by Galdieri from the deductive examination of the several hypotheses of terrace formation:—It is concluded that the climatic changes associated with the successive epochs of the glacial period were primarily responsible for the alterations between erosion of the valley floors and deposition of the heavy gravels upon them. Land movements are regarded as of subordinate importance. A distant reviewer, not acquainted with the ground, must not venture to criticize the application of this conclusion to the special case of the Picentino; but he may point out that, in so far as the deductive discussion of the problem is concerned, it would demand a very strong climatic change to cause, in a river of moderate length, the deep erosion of new valleys beneath the broadly opened rock-floor of a first formed, *late mature* valley, unless land movement acted as an important contributory cause. It would seem, indeed, as if the stage of valley development, as represented by width rather than by depth of valley floor, had received insufficient consideration in the deductive discussion as well as in the introductory exposition of the Picentino problem.

W. M. DAVIS.

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 1904 Beaman, George Herbert.
 1904 Beaman, Mrs. Charles C.
 1908 Beck, Fanning C. T.
 1886 Beddall, Edward F.
 1875 Beekman, Gerard.
 1874 Belding, Milo M., Sr.
 1897 Belding, Milo M., Jr.
 1891 Belin, Henry, Jr.
 1900 Bell, Alexander Graham.
 1900 *Bell, Bertrand F.*
 1897 Bell, Dr. Ralcy H.
 1905 *Belmont, Perry.*
 1909 Benjamin, Miss Ida.
 1903 *Bennett, Frederick W., C.E.*
 1868 Bennett, James Gordon.
 1906 Bennett, John H.
 1906 Berner, Charles E.
 1908 Bernheimer, Adolph L.
 1903 *Bernheimer, Charles L.*
 1890 Bertschmann, J.
 1886 Berwind, Edward J.
 1910 *Betts, Samuel R.*
 1869 Bickmore, Prof. A. S.

Date of Election.

- 1889 *Bigelow, Poultney.*
1909 Bigelow, Dr. William Sturgis.
1906 *Billings, Richard.*
1893 Birdsall, Mrs. W. R.
1905 Bishop, Heber R.
1905 Bissell, Clinton T.
1905 Blaine, William T.
1906 Blair, C. Ledyard.
1898 Blake, Theodore A.
1878 *Bliss, Cornelius N.*
1901 Bliss, William H.
1910 *Blumenthal, George.*
1891 Bogue, Virgil G.
1909 Bond, F. E.
1886 Bond, Frank S.
1905 Bond, Stephen N.
1884 *Bonner, G. T.*
1908 Boocock, Murray.
1904 *Bookman, Samuel, Ph.D.*
1899 Booraem, John V. V.
1886 Bouvier, M. C.
1902 *Bowditch, Charles P.*
1904 Bowditch, Ernest W.
1900 *Bowdoin, George S.*
1904 *Bowdoin, Temple.*
1886 Bowers, John M.
1883 *Bowne, Walter.*
1909 Boyd, James.
1890 *Brackenridge, George W.*
1904 Bradford, Sidney.
1904 *Bradley, Arthur C.*
1904 Bragaw, E. T.
1897 *Brainard, Lt.-Col. David L.,*
U.S.A.
1890 Brewster, Charles O.
1904 Brewster, George S.
1902 *Brewster, Robert S.*
1909 Brice, W. Kirkpatrick.
1886 Bridgman, Edward C.
1900 Bridgman, Herbert L.
1905 Briscoe, Willis A.
1903 Brizse, Charles N.
1911 *Brokaw, Wm. Gould.*
1889 *Bromberg, Frederick G.*
1890 Brooker, Chas. F.
1904 Brooks, Alfred H.
1906 Brooks, John F.
1886 *Brown, Addison.*
1903 Brown, Col. F. Q.

Date of Election.

- 1878 Brown, J. Romaine.
1887 *Brown, Robert I.*
1911 Brown, Stephen Pearson.
1910 Brown, W. C.
1904 *Brown, William L.*
1909 Browne, Belmore H.
1875 Brownell, Silas B.
1910 Browning, J. Hull.
1874 *Brownson, Rear Adm. Willard H.*
U.S.N.
1901 *Bruce-Brown, William.*
1904 Bruggerhof, F. W.
1901 Bruguère, Louis Sather.
1910 Brundrett, Robert.
1902 *Buchanan, James Isaac.*
1911 Bucknell, Mrs. William.
1905 Buel, John L., M.D.
1900 Bulkley, Justice L.
1903 *Bunker, George R.*
1908 Burden, James A.
1902 *Burrage, Albert C.*
1902 *Burrage, Albert C., Jr.*
1902 *Burrage, Francis H.*
1902 *Burrage, Russell.*
1910 Burrridge, Lee S.
1903 Burton, Prof. A. E.
1906 Butler, Charles Stewart.
1908 Butler, Howard Crosby.
1905 Butler, M. J., C.M.G., C.E.
1907 Buzzacott, Francis F.
1909 *Cadwalader, John L.*
1903 Caesar, Henry A.
1911 Cahoon, W. M.
1897 Cameron, W. L.
1910 Camp, James S.
1888 Canda, Charles J.
1887 Cannon, H. W.
1908 *Cannon, Henry Brevoort.*
1910 Cannon, James G.
1884 Carey, Henry T.
1904 *Carnegie, Andrew.*
1901 *Carnegie, George L.*
1904 Carnegie, Thomas Morris.
1889 *Carter, John J.*
1897 Cassard, William J.
1906 Chadbourne, Wm. M.
1905 Chaloner, John Armstrong.
1897 Chamberlain, Rev. John.
1899 Chambers, Arthur D.

Date of Election.

- 1897 Chambers, Frank R.
 1906 Champ, Wm. S.
 1890 Chanler, William Astor.
 1905 Channing, J. Parke.
 1897 *Chapin, Chester W.*
 1883 *Chapman, Henry E.*
 1911 Chapman, Robert Hollister.
 1910 Chappell, Howard F.
 1904 Chatfield-Taylor, H. C.
 1886 *Chauncey, Elihu.*
 1911 Chew, Benjamin.
 1906 Chew, Beverly.
 1899 Chisholm, Hugh J.
 1909 Chisolm, B. Ogden.
 1888 Chisolm, George E.
 1906 Choate, Joseph H.
 1897 Church, George H.
 1884 *Claffin, John.*
 1891 Clapp, George H.
 1905 Clark, Alzamora H.
 1908 Clark, Charles A.
 1905 Clark, Frank E.
 1887 Clark, Jefferson.
 1901 Clark, W. A.
 1882 *Clarkson, Banyer.*
 1889 Clausen, George C.
 1907 Cleland, Herdman F.
 1883 Clews, Henry.
 1883 Clyde, William P.
 1890 Cockcroft, Miss Mary T.
 1897 Coffin, C. A.
 1886 Coffin, Edmund.
 1891 Cogswell, W. B.
 1901 Cole, George Watson.
 1910 Collier, Robert J.
 1886 *Colvin, Verplanck.*
 1897 Combe, Mrs. William.
 1897 *Comstock, Frederick H.*
 1889 Comstock, George Carlton.
 1899 Condon, Thomas G.
 1886 Conger, Clarence R.
 1884 *Connor, W. E.*
 1898 Cook, Eugene B.
 1894 Cook, Dr. Frederick A.
 1893 Coolidge, J. Randolph.
 1903 Cornell, Russell R.
 1902 Corning, Christopher R.
 1897 Corning, G. M.
 1905 Corning, Parker.

Date of Election.

- 1886 Corthell, Elmer L.
 1902 Cotton, Louis K.
 1888 *Coutant, Charles Albert.*
 1905 Coutant, Dr. Richard B.
 1905 Cowee, Harvey D.
 1906 Cowperthwait, Herbert M.
 1899 *Cox, John Lyman.*
 1902 *Coxe, Eckley B., Jr.*
 1889 *Crane, Charles R.*
 1906 Crane, George F.
 1902 *Crane, Zenas.*
 1887 *Cranitch, William I. A.*
 1909 Cravath, Erastus M.
 1905 Crile, George, M.D.
 1888 Crimmins, John D.
 1874 Crosby, J. Schuyler.
 1901 *Crozier, Capt. William.*
 1906 Crozier, Wm. Armstrong.
 1903 Cuntz, J. H.
 1905 Curtis, George Carroll.
 1901 *Curtis, William Edmond.*
 1884 Dalley, Henry.
 1908 d'Altomonte, Baron A. Benedetti.
 1906 Dalton, H. G.
 1871 Daly, Joseph F.
 1895 Daniels, Charles H.
 1892 Daniels, W. L.
 1906 Darlington, Thos., M.D.
 1875 Davies, Julien T.
 1906 Davis, Charles Henry.
 1906 Davis, Daniel A.
 1884 Davis, Howland.
 1877 *Davis, Joseph Beale.*
 1905 *Dean, Mrs. Bashford.*
 1880 *Deane, John H.*
 1909 *de Coppet, Edward J.*
 1901 de Coppet, Henry.
 1910 Deen, Mrs. Emile Andrews.
 1910 De Garmo, Dr. Wm. Burton.
 1895 De Kalb, Courtenay.
 1900 *Delafield, Albert.*
 1874 Delafield, Maturin L.
 1909 *Delano, Warren, Jr.*
 1911 Dellenbaugh, Fred'k S.
 1890 Dellinger, Charles F.
 1906 Denholm, Wm. J.
 1901 Dennis, Rev. James S.
 1899 Dennis, John B.
 1905 *de Peyster, Frederic Ashton.*

Date of Election.

1910 Dexter, George B.
 1904 Dey, Anthony.
 1903 Dick, Evans R.
 1894 Dieterich, Charles F.
 1897 Dillingham, Edwin R.
 1905 Dimmick, J. Benjamin.
 1905 Dimock, George E.
 1904 Dix, Samuel M.
 1881 *Docharty, Augustus T.*
 1897 Dodge, Rev. D. Stuart.
 1903 Dodge, Gen. Grenville M.
 1896 Dodge, Richard E.
 1893 Dodson, Robert Bowman.
 1875 Dommerich, L. F.
 1889 *Donald, Peter.*
 1899 Doremus, Robert P.
 1897 Doughty, Mrs. Alla.
 1884 *Douglas, James.*
 1903 Douglass, R. D.
 1905 *Dowling, Robt. E.*
 1910 Drayton, J. Coleman.
 1888 *Drexel, Mrs. Joseph W.*
 1880 Du Bois, Frederick N.
 1874 *Du Bois, William A.*
 1898 Dunham, Edward K., M.D.
 1897 Dunnell, William N., D.D.
 1905 Dunning, Clement S.
 1911 Dunning, Wm. B.
 1906 Du Pont, Alexis I.
 1889 Du Pont, Col. H. A.
 1909 du Pont, P. S.
 1901 *Durand, John S.*
 1889 Durkee, Eugene W.
 1894 Duvall, William C.
 1889 Dwight, Jonathan, Jr., M.D.
 1909 Dyer, Frank L.
 1886 *Easton, Robert T. B.*
 1905 Eaton, Charles Edwin.
 1910 Eaton, Fred'k H.
 1902 Eberstadt, Edward F.
 1905 *Eckert, Thomas T., Jr.*
 1906 Eddy, Spencer.
 1882 Edwards, J. Pierrepont.
 1887 Egleston, Melville.
 1897 Eimer, August.
 1901 *Eldert, Cornelius.*
 1901 *Eldridge, Lewis A.*
 1879 *Elliott, Samuel.*
 1886 Ellis, George W.

Date of Election.

1882 *Ellis, Wilbur Dixon.*
 1903 Ellis, William H.
 1882 *Emerson, John W.*
 1909 Emmet, C. Temple.
 1904 Emmons, Arthur B.
 1903 Endicott, William C.
 1883 Eno, Amos F.
 1906 Entz, George Gilbert.
 1903 Eskesen, Eckhardt V.
 1906 Estabrook, A. F.
 1891 Eustis, W. E. C.
 1909 *Evarts, Allen W.*
 1906 Evers, Cecil C.
 1909 Fabbri, Alessandro.
 1905 Fahs, Charles H.
 1882 Fairbanks, Leland.
 1890 Fairchild, Chas. S.
 1892 Fairchild, Samuel W.
 1902 Fairleigh, David W.
 1875 Fargo, James C.
 1905 *Farish, John B.*
 1906 Farnham, Paulding.
 1901 *Farnsworth, William.*
 1874 Farragut, Loyall.
 1890 *Fearing, Daniel B.*
 1909 *Fearing, George R.*
 1898 Fearons, Geo. H.
 1898 *Ferguson, Henry.*
 1888 *Ferguson, Walton.*
 1906 Ferry, Mansfield.
 1910 Findley, S. Emerson.
 1904 Fish, Charles Henry.
 1908 Fisk, Arthur Lyman, M.D.
 1902 Fisk, Pliny.
 1886 *Flagler, H. M.*
 1907 Fleischmann, Max C.
 1889 Flint, Chas. R.
 1901 *Flower, Frederick S.*
 1906 Floyd-Jones, G. Stanton.
 1875 Folsom, George W.
 1875 *Ford, James B.*
 1909 Fortescue, Granville R.
 1910 Foshay, P. Maxwell, M.D.
 1901 Fowler, Jonathan Odell, Jr.
 1906 *Fowler, Thomas Powell.*
 1874 *Fox, Austen G.*
 1909 Frank, Felix.
 1884 Frazer, Alfred.
 1873 Freedman, John J.

Date of Election.

- 1889 Freeland, Theodore H.
 1909 *Frick, Childs.*
 1894 Frick, John.
 1902 Frissell, A. S.
 1906 Fryé, Jed.
 1875 Fuller, Charles D.
 1903 *Gaff, Thomas T.*
 1889 *Gage, E. B.*
 1905 Gaines, David H.
 1886 Gallatin, Frederic.
 1904 *Gammell, William.*
 1904 Garrett, Robert.
 1907 Gartland, George E.
 1897 Garver, John A.
 1903 *Gates, Isaac E.*
 1910 Gates, Rev. Milo Hudson.
 1891 Gay, Edward.
 1879 Gay, Joseph E.
 1905 Geer, Robert C.
 1906 Geil, Wm. Edgar, Litt.D., LL.D.
 1868 *Gerry, Elbridge T.*
 1903 Gibney, John R.
 1909 Giddings, Franklin H.
 1906 Gielow, Henry J.
 1901 *Gilbert, Clinton.*
 1889 Gilbert, G. K.
 1893 *Gilbert, J. H. Grenville.*
 1910 Gilfedder, T. P.
 1909 Goddard, Conrad G.
 1909 *Goelet, Robert.*
 1897 Golding, John Noble.
 1910 Goldman, Henry.
 1905 Goldsborough, John Byron.
 1904 *Goodhart, Philip J.*
 1898 *Goodnow, Harold P.*
 1900 Goodridge, F. G., M.D.
 1886 *Goodwin, James J.*
 1887 Gould, George J.
 1905 Granbery, Julien Hastings.
 1906 Grant, Jesse R.
 1905 Grant, Madison.
 1904 *Graves, George Coe.*
 1895 Greeff, Ernest F.
 1906 Green, Francis C.
 1901 Green, Pinckney F.
 1883 *Greenough, John.*
 1856 Greenwood, Isaac J.
 1892 Greenwood, Langdon.
 1909 Griffin, Francis B.

Date of Election.

- 1909 Grinnell, George Bird.
 1897 Gruber, Abraham.
 1903 Guggenheim, Simon.
 1909 Guiteras, Ramon.
 1904 *Gunther, Bernard G.*
 1886 *Gunther, Franklin L.*
 1891 Haas, Kalman.
 1906 *Hadden, John A., Jr.*
 1874 *Haines, John P.*
 1906 Hall, Harry Alvan.
 1903 Hamilton, Edmond H.
 1879 Hamilton, William Gaston.
 1905 Hammond, John Henry.
 1909 Hanna, Charles A.
 1904 Hansmann, Carl A.
 1888 Harbeck, Charles T.
 1888 Hard, Anson W.
 1905 Hardenbergh, William P.
 1901 Hardie, Wainwright.
 1900 Harding, Edward.
 1900 Hardley, J. Wheeler.
 1909 *Harkness, Charles W.*
 1911 Harris, W. R.
 1906 Hart, Richard P.
 1897 Hart, Walter T.
 1905 Hartzell, J. Culver.
 1904 *Haupt, Louis, M.D.*
 1905 Havemeyer, H. O.
 1859 *Havemeyer, John C.*
 1902 *Havemeyer, William F.*
 1894 Haven, J. Woodward.
 1909 Hawxhurst, Robert, Jr.
 1909 Hayes, S. W.
 1889 Haynes, Henry W.
 1891 Hazard, Frederick R.
 1897 *Hearn, George A.*
 1883 *Hebert, Henry B.*
 1902 Hedge, Frederic H.
 1903 Heimann, Julius.
 1901 Hentz, Henry.
 1899 *Herbert, John W.*
 1909 Herbert, William.
 1903 Herrmann, Nathan.
 1900 Herzog, F. Benedict, Ph.D.
 1904 *Hess, Selmar.*
 1904 *Heurich, C.*
 1903 *Hewitt, Peter Cooper.*
 1900 Hewlett, Walter Jones.
 1901 Heydt, Herman A.

Date of Election.

1906 Hickey, Jas. H.
1906 Higginson, Adm. Francis J.,
U.S.N., Retired.
1909 Higginson, James J., Jr.
1894 Hildreth, J. Homer.
1903 Hill, Charles B.
1890 Hill, James J.
1908 Hill, Samuel.
1909 Hillhouse, J. Ten Broeck.
1904 *Himmelwright, A. L. A.*
1887 Hinchman, Walter.
1881 Hinman, Russell.
1903 *Hirsch, Robert B.*
1904 Hitchcock, Mrs. Roswell D.
1905 Hobby, C. M., M.D.
1904 Hoe, Alfred G.
1897 Hoe, William A.
1876 Hoes, William M.
1897 Hoey, Rev. Joseph L.
1901 Hoffman, Charles F., Jr.
1910 *Hoffman, Samuel V.*
1872 *Holbrook, Levi.*
1909 Holland, Arthur L., M.D.
1876 Holt, Henry.
1902 Holton, Henry D., M.D.
1901 *Hopkins, George B.*
1896 *Hotchkiss, Miss C. W.*
1898 Howell, Maxwell D.
1909 Howell, Wilson S.
1905 Hoxie, William D.
1909 *Hoyt, Alfred W.*
1888 *Hoyt, Henry R.*
1906 Hubbard, Geo. D.
1906 *Hubbard, John.*
1898 *Hubbard, Robert J.*
1901 *Hubbard, Thomas H.*
1885 Hubbard, Walter.
1900 Hudnut, Richard A.
1897 Humphreys, Alexander C., M.E.
1911 Huntington, Mrs. Arabella D.
1893 *Huntington, Archer M.*
1909 Huntington, Charles P.
1909 *Huntington, Henry E.*
1910 Hutting, Miss Ella.
1883 *Hurry, Edmund Abdy.*
1909 Hurst, George D.
1889 *Hurt, Frank D.*
1890 Husted, Seymour L., Jr.
1883 Hyde, E. Francis.

Date of Election.

1910 *Hyde, Henry St. John.*
1901 *Hyde, James H.*
1905 Iddings, Andrew S.
1905 Iddings, Daniel W.
1899 Insull, Samuel.
1909 Irving, Cortlandt.
1890 Irving, Walter.
1874 Iselin, Adrian, Jr.
1887 *Isham, Charles.*
1881 *Ives, Brayton.*
1903 Jackson, A. Wendell.
1886 *Jackson, Rev. Samuel M.*
1897 Jackson, Theodore F.
1886 Jacobi, Abraham, M.D.
1891 Jaffray, Robert.
1894 James, Arthur Curtiss.
1911 James, Norman.
1890 James, Walter B., M.D.
1891 Jaques, W. H.
1906 Jarves, Deming.
1903 Jarvie, James N.
1879 Jay, William.
1893 Jenkins, Michael.
1895 Jennings, Oliver G.
1911 *Jennings, Walter.*
1902 Jessup, Henry W.
1880 *Jewett, George L.*
1906 *Jewett, W. K.*
1881 Johnson, Bradish.
1901 Johnson, Edward C.
1906 *Jones, Charles Landon.*
1906 Jones, Dwight A.
1888 *Jones, Oliver L.*
1909 Judson, Henry I.
1885 Juilliard, A. D.
1901 Julian-James, Mrs. Cassie.
1904 Jungmann, J., M.D.
1906 Junkin, J. de F., Jr.
1898 Kahn, O. H.
1909 Kammerer, Robert C.
1881 *Kane, Grenville.*
1893 *Kane, Henry Brevoort.*
1895 *Kean, Hamilton Fish.*
1908 Keck, Thomas A.
1880 *Keene, James R.*
1888 Kellogg, Charles.
1897 Kemmerer, M. S.
1903 Kemp, James Furman.
1873 *Kennan, George.*

Date of Election.

- 1901 Kennedy, E. G.
 1901 *Kennedy, George G., M.D.*
 1888 Kennedy, H. Van Rensselaer.
 1904 Kenyon, Robert N.
 1906 Kenyon, Wm. Houston.
 1885 *Keppler, Rudolph.*
 1903 Kerr, John B.
 1883 Kerr, Walter.
 1909 Keyes, William F.
 1886 *Kidder, Camillus G.*
 1904 Kidder, Edward H.
 1897 Kimball, Alfred R.
 1883 King, D. H., Jr.
 1882 *King, George Gordon.*
 1892 King, John Hurtin.
 1904 King, W. Nephew.
 1901 Kirby, Thomas E.
 1881 Kirsch, Louis.
 1906 Kittredge, Geo. L.
 1911 Klein, S. R., M.D.
 1887 *Knight, George T.*
 1901 Kohlman, Charles.
 1897 Kohn, S. H.
 1901 Kohnstamm, Emil V.
 1906 *Kuhn, August.*
 1909 *Kunhardt, Henry Rudolph 3d.*
 1905 La Fétra, Linnæus Edford, M.D.
 1910 Lampland, Carl Otto.
 1909 Landers, George M.
 1895 Landon, Francis G.
 1898 Lane, Wolcott G.
 1882 Langdon, Woodbury.
 1831 *Langdon, Woodbury G.*
 1882 Lapham, Lewis H.
 1904 *Laughlin, George M.*
 1909 Lawrence, Emlen N.
 1910 Lawrence, Enoch P., M.D.
 1902 Lawrence, John Burling.
 1904 Lawrence, W. B.
 1909 Lawrence, William W.
 1903 Lawson Victor F.
 1906 Lawton, James M.
 1909 Leask, George.
 1886 *Leete, Charles H.*
 1906 *Leffingwell, Rev. C. W., D.D.*
 1903 Lehmaier, James M.
 1909 Leland, Charles H.
 1905 Lemon, Dr. J. S.
 1909 Le Roy, Edward A., Jr.

Date of Election.

- 1903 Leshner, Arthur L.
 1901 *Leupp, William H.*
 1902 Leverich, S. Duncan.
 1904 Levi, Emil S.
 1896 *Lewis, Clarence McK.*
 1881 *Libbey, William.*
 1903 Lincoln, Lowell.
 1902 Linderman, Garrett B.
 1905 Lindsey, Edward.
 1899 *Lippincott, Henry H.*
 1903 Lisman, Frederick J.
 1910 Littell, John MacGregor.
 1881 *Little, Joseph J.*
 1897 *Livingston, Goodhue.*
 1897 Lobenstine, William C.
 1909 Locatelli, E. H.
 1909 Locke, Jesse Albert.
 1904 Lodge, Henry Cabot.
 1900 *Loeb, Morris.*
 1891 Loewy, Benno.
 1906 Loines, Stephen.
 1903 *Lorillard, Pierre.*
 1878 *Loubat, J. F., LL.D.*
 1908 Loughran, Dr. Robert L.
 1883 Lounsbery, R. P.
 1876 *Low, A. Augustus.*
 1875 *Low, Seth, LL.D.*
 1903 *Low, William G.*
 1905 *Lowell, Percival.*
 1909 Lybrand, William M.
 1889 Lydig, David.
 1900 Lyman, Frank.
 1888 *Lynch, James D.*
 1906 Lyon, David H.
 1895 *McCord, William H.*
 1887 McCready, N. L.
 1909 McCurdy, Robert H.
 1906 McDonald, William.
 1903 McDougall, Walter.
 1907 McDowall, Walter R.
 1901 *McFarlane, C. T.*
 1888 McKeever, J. Lawrence.
 1898 McLean, Donald.
 1904 *McMillan, William Northrup.*
 1895 McMillin, Emerson.
 1903 McWilliams, Daniel W.
 1903 Maas, Gustavus.
 1905 Macdonald, Benjamin J.
 1909 MacDougal, D. T.

Date of Election.

- 1905 MacDougall, George R.
- 1903 Mackay, Clarence H.
- 1883 Mackay, Donald.
- 1884 MacKellar, William.
- 1890 Mackey, Charles W.
- 1898 MacKie, Charles Paul.
- 1901 Macy, George H.
- 1901 Macy, V. Everitt.
- 1904 Mager, F. Robert.
- 1899 Mahl, William.
- 1903 Mann, William D'Alton.
- 1905 Manning, Charles H., U.S.N.
- 1874 Marble, Manton.
- 1904 Marcou, John B.
- 1895 Marcus, George E.
- 1909 Markle, George B.
- 1909 Marling, Alfred E.
- 1888 Marquand, Henry.
- 1898 Marsh, Joseph A.
- 1901 Marshall, Charles H.
- 1897 Marshall, Louis.
- 1898 Marston, Edwin S.
- 1875 Martin, Bradley.
- 1910 Martin, Bradley, Jr.
- 1911 Martin, Fred. Townsend.
- 1911 Martin, Howard Townsend.
- 1888 Martin, Oswald J.
- 1910 Martin, Newell.
- 1910 Martin, Dr. Winfred R.
- 1909 Marwick, James.
- 1888 Mason, Alexander T.
- 1901 Mather, Samuel.
- 1901 Matthews, Albert.
- 1903 Maxwell, Francis Taylor.
- 1901 Maxwell, Robert.
- 1906 Maxwell, Wm.
- 1905 Meeker, Stephen J.
- 1891 Meeks, Edwin B.
- 1909 Melcher, John S.
- 1902 Mellen, Charles S.
- 1911 Meredith, Rev. Fred. Charles.
- 1904 Meredith, William T.
- 1909 Meyer, Eugene, Jr.
- 1901 Meyer, Harry H.
- 1910 Middlebrook, George H.
- 1897 Millar, George W.
- 1909 Miller, Francis Trevelyan.
- 1901 Miller, Dr. George N.
- 1892 Mills, A. G.

Date of Election.

- 1911 Mitchell, Albert M. Post.
- 1909 Mitchell, Edward P.
- 1905 Mixer, Frederick K.
- 1909 Moffat, R. Burnham.
- 1905 Mohr, Louis.
- 1902 Monks, John, Jr.
- 1909 Monsen, Frederick I.
- 1890 Montant, Alphonse.
- 1909 Montgomery, William S.
- 1906 Moore, C. Arthur, Jr.
- 1906 Moore, Henry Du Bois Bailey.
- 1904 Moore, John Bassett.
- 1884 Moore, Joseph, Jr.
- 1910 More, Taylor.
- 1883 Morgan, E. D.
- 1906 Morgan, Frederick G.
- 1874 Morgan, J. Pierpont.
- 1901 Morgan, J. P., Jr.
- 1887 Morgan, William Fellows.
- 1889 Morgan, William H.
- 1906 Morrell, Joseph B.
- 1910 Morris, Dave H.
- 1874 Morris, Henry Lewis.
- 1897 Morris, Mrs. Lewis G.
- 1906 Morris, Lewis R., M.D.
- 1898 Morris, Newbold.
- 1902 Mortimer, Rev. Dr. Alfred G.
- 1908 Mortimer, Edmund.
- 1907 Mortimer, Richard.
- 1864 Morton, Levi P.
- 1909 Morton, Quincy L.
- 1910 Mosonyi, Emil.
- 1906 Mullins, Edwin Stanton.
- 1909 Munsey, Frank A.
- 1909 Murphy, Franklin, Jr.
- 1904 Myers, Joseph G.
- 1888 Myers, Theodore W.
- 1901 Neeser, John G.
- 1909 Neill, Robert L.
- 1909 Neilson, Henry A.
- 1910 Neilson, John.
- 1905 Nelsen, Dr. Wolfred.
- 1910 Nesbitt, Abram G.
- 1891 Neukirch, Chas.
- 1910 Nevin, Miss Blanche.
- 1899 Newbold, Clement Buckley.
- 1897 Newell, Frederick Haynes.
- 1899 Newton, James S.
- 1897 Nixon, Lewis.

Date of Election.

1908 North, Arthur Walbridge.
 1897 Notman, George.
 1906 Oakes, Charles.
 1888 *Oakes, T. F.*
 1898 Obermeyer, Joseph.
 1879 *O'Brien, Thomas S.*
 1910 Ochs, Adolph S.
 1875 *O'Connor, Thomas H.*
 1879 O'Gorman, Richard.
 1909 Olcott, Dudley.
 1901 O'Leary, H. A.
 1909 Oliver, French E. D.D.
 1910 Olsson-Seffer, Pehr., Ph.D.
 1905 *Olyphant, Robert.*
 1874 Olyphant, Robert M.
 1875 *Opdyke, William S.*
 1893 Operti, Albert.
 1882 Oppenheim, Edward L.
 1889 Orr, Alexander E.
 1901 *Orvis, Charles E.*
 1909 *Osborn, Henry Fairfield.*
 1905 *Osborn, William Church.*
 1910 Osborne, Thomas M.
 1901 Outerbridge, Dr. Paul.
 1896 Owen, James, C.E.
 1895 *Owen, Miss Luella A.*
 1905 *Packard, Ralph G., Jr.*
 1898 *Paget, Almeric H.*
 1909 Palmer, Frederick.
 1889 Palmer, Stephen S.
 1911 Pam, Max.
 1899 *Parish, Edward C.*
 1872 *Parish, Henry.*
 1905 Parish, Henry, Jr.
 1905 *Parker, Herschel C.*
 1902 *Parker, James H.*
 1905 Parks, C. W., C.E., U.S.N.
 1886 Parris, Edward L.
 1882 *Parrish, James C.*
 1909 Parsons, Charles W.
 1882 *Parsons, Mrs. Edwin.*
 1905 Parsons, Herbert.
 1882 Parsons, John E.
 1910 Partridge, George H.
 1902 Paton, David.
 1897 *Paton, William Agnew.*
 1909 Patten, William.
 1907 Peabody, Charles A.
 1909 Peabody, George Foster.

Date of Election.

1889 Peck, Charles E.
 1898 *Pell, Frederick A.*
 1906 *Pell, Howland Haggerty.*
 1901 Pell, Stephen H. P.
 1910 Penfield, Frederic Courtland.
 1874 Penfold, William Hall.
 1906 *Penniman, James H.*
 1898 Pennington, William.
 1890 *Perkins, William H.*
 1908 Perry, Rufus Lewis.
 1888 Perry, William A.
 1891 Peters, Edward McClure.
 1887 Peters, Samuel T.
 1903 *Peters, William Richmond.*
 1909 Pfeiffer, Curt G.
 1906 Phelps, Dr. Gouverneur Morris.
 1901 *Phelps, John J.*
 1902 *Phipps, Lawrence C.*
 1887 *Phoenix, Lloyd.*
 1886 *Phoenix, Phillips.*
 1889 *Pickering, Edward C.*
 1905 Pickett, William Douglas.
 1895 Pickhardt, Carl.
 1902 Pierce, Henry Clay.
 1906 *Pierrepoint, R. Stuyvesant.*
 1898 Piorkowski, Major A. E.
 1885 *Planten, John R.*
 1893 *Platt, J. D.*
 1906 Platt, Lewis A.
 1905 Plimpton, Dr. Warren O.
 1890 *Plumb, Edward L.*
 1884 *Plush, Dr. Samuel M.*
 1906 Poe, I. N.
 1906 Poor, Henry V.
 1911 Poor, Ruel W.
 1891 *Porter, Henry Kirke.*
 1897 Porter, William H.
 1909 *Porter, William L.*
 1905 *Post, Abram S.*
 1884 Post, George B.
 1885 *Post, William Henry.*
 1890 Potter, Edward Clarkson.
 1898 Potter, Frederick.
 1901 *Potts, Jesse W.*
 1903 *Potts, Thomas.*
 1880 Powell, Wilson M.
 1910 Power, John A.
 1897 Prentiss, George Lewis.
 1909 Pruyn, Frederic.

Date of Election.

- 1886 Preyer, Charles.
- 1901 Purdy, J. Harsen.
- 1905 Putnam, Henry St. Clair.
- 1903 Pyle, James Tolman.
- 1894 Pyne, M. Taylor.
- 1898 Pyne, Percy R.
- 1906 Queen, Emmet.
- 1908 Radford, Harry, V. M. Sc., C.E.
- 1911 Rainey, Paul J.
- 1903 Randolph, Evan.
- 1906 Randolph, Stewart F.
- 1868 Raven, Anton A.
- 1905 Raven, John Howard, D.D.
- 1898 Rawson, Edward Stephen.
- 1890 Raymond, Charles H.
- 1886 Raymond, R. W.
- 1902 Rea, Samuel.
- 1901 Rea, Thomas B.
- 1902 Ream, Norman B.
- 1905 Reckefus, Charles V., Jr., M.D.
- 1898 Redding, Joseph D.
- 1903 Reed, Charles.
- 1911 Reid, Wallace.
- 1874 Reid, Whitelaw.
- 1911 Remsen, Charles.
- 1888 Renwick, Edward S.
- 1874 Reynes, Jaime.
- 1903 Reynolds, James B.
- 1882 Rhineland, Charles E.
- 1909 Rhineland, Rev. Philip M.
- 1898 Rhineland, Miss Serena.
- 1886 Rice, Isaac L.
- 1903 Richard, Edward A.
- 1901 Riker, Samuel.
- 1874 Riker, William J.
- 1901 Rives, George Barclay.
- 1872 Robbins, Chandler.
- 1891 Robbins, Miss Harriet L.
- 1901 Robertson, Julius.
- 1907 Robinson, Dr. E. S.
- 1901 Robinson, Nelson.
- 1888 Robinson, William Moore.
- 1908 Rockwood, Charles G. Jr., Ph.D.
- 1903 Roe, Albert S.
- 1890 Roe, Major-Gen. Charles F.
- 1889 Roelker, Alfred.
- 1906 Rogers, Abbott S.
- 1887 Rogers, Archibald.
- 1905 Rogers, Edward L.

Date of Election.

- 1903 Rogers, Robert.
- 1896 Roncière, St. Croix de la.
- 1905 Roosevelt, Franklin Delano.
- 1868 Rose, Cornelius.
- 1903 Ross, Morgan R.
- 1911 Runyon, Walter Clark.
- 1905 Ruprecht, Philip.
- 1910 Rusch, Adolph, Jr.
- 1897 Rusch, Henry A.
- 1899 Russak, Frank.
- 1874 Russell, Archibald D.
- 1889 Ryan, Thos. F.
- 1906 Sachs, Arthur.
- 1906 Sachs, Paul J.
- 1905 Sachs, Samuel.
- 1909 Safe, Thomas Shaw.
- 1898 Salomon, William.
- 1911 Saltus, J. Sanford.
- 1901 Sampson, Alden.
- 1904 Sampson, Charles E.
- 1910 Sanderson, Edwin N.
- 1875 Sandford, Elliott.
- 1895 Sands, Robert C.
- 1908 San Marzano, Robert Asinari de.
- 1886 Satterlee, F. LeRoy, M.D.
- 1903 Satterlee, Herbert L.
- 1904 Saul, Charles R.
- 1870 Schafer, Samuel M.
- 1911 Scheftel, Edwin K.
- 1874 Schermerhorn F. Augustus.
- 1890 Schernikow, Ernest.
- 1911 Scheffelin, Schuyler.
- 1875 Schiff, Jacob H.
- 1902 Schiff, Mortimer L.
- 1903 Schirmer, Rudolph E.
- 1885 Schmelzel, William R.
- 1901 Schmid, Dr. H. Ernest.
- 1905 Schott, Charles M., Jr.
- 1888 Schultze, John S.
- 1882 Schuyler, Spencer D.
- 1902 Schwab, Charles M.
- 1883 Scott, Rufus L.
- 1911 Scoville, Robert.
- 1906 Scribner, Charles.
- 1895 Scudder, Moses L.
- 1905 Scull, Harry.
- 1909 Seabury, Charles B.
- 1909 Seaman, Louis Livingston, M.D.
- 1901 Seligman, Isaac N.

Date of Election.

- 1909 *Seligman, Jefferson.*
 1887 *Sellew, T. G.*
 1903 *Sells, Elijah W.*
 1902 *Seward, Frederick W.*
 1898 *Seward, Gen. William H.*
 1893 *Sexton, Edward Bailey.*
 1909 *Seymour, Morris W.*
 1905 *Shailer, William Griggs.*
 1871 *Shaler, Major-Gen. Alexander.*
 1897 *Shardlow, Joseph.*
 1903 *Shaughnessy, Sir Thomas G.*
 1893 *Shaw, Charles A.*
 1910 *Shaw, Louis Agassiz.*
 1906 *Shaw, Walter W.*
 1897 *Sheehy, W. H.*
 1905 *Sheffield, George St. John.*
 1888 *Sheldon, Edwin B.*
 1888 *Sherman, Charles A.*
 1886 *Sherman, George.*
 1865 *Sherman, W. Watts.*
 1898 *Shillaber, William, Jr.*
 1876 *Sibley, Hiram W.*
 1903 *Siegel, Henry.*
 1903 *Siegel, Jacob.*
 1903 *Simpson, Ernest L.*
 1911 *Simpson, John Boulton.*
 1910 *Sinclair, Henry A.*
 1906 *Slater, James.*
 1910 *Sloan, Benson B.*
 1910 *Sloan, Samuel.*
 1910 *Sloan, William S.*
 1899 *Smiley, Albert K.*
 1901 *Smilie, Charles F.*
 1893 *Smith, Benjamin E.*
 1890 *Smith, Sir Donald A.*
 1902 *Smith, Dr. E. Fayette.*
 1879 *Smith, E. Reuel.*
 1906 *Smith, George H.*
 1887 *Smith, Nathaniel S.*
 1901 *Smith, Ormond G.*
 1889 *Smith, Philip Sherwood.*
 1910 *Smith, Pierre J.*
 1890 *Snow, Elbridge G.*
 1903 *Snow, Fred W.*
 1909 *Solari, Luigi.*
 1911 *Souther, Charles Edward.*
 1880 *Southwick, Henry K.*
 1906 *Spangler, Harry A., M.D.*
 1883 *Spence, Lewis H.*

Date of Election.

- 1905 *Spencer, Edwards.*
 1905 *Spencer, Henry B.*
 1911 *Spencer, Lorillard.*
 1906 *Speranza, Gino C.*
 1905 *Speyer, James.*
 1911 *Spingarn, Joel E.*
 1856 *Spofford, Paul N.*
 1910 *Spottiswood-Mackin, Countess.*
 1909 *Spring, Miss Anna Riker.*
 1904 *Squires, Grant.*
 1897 *Standish, Miles.*
 1905 *Stanton, Robert Brewster.*
 1910 *Staples, C. Bayard.*
 1909 *Steese, James Gordon.*
 1907 *Stefánsson, V.*
 1911 *Stein, Enrico N.*
 1903 *Steinway, Frederick T.*
 1904 *Sterry, John DeWitt.*
 1879 *Stetson, Francis Lynde.*
 1887 *Stetson, George W.*
 1910 *Stetson, John B., Jr.*
 1911 *Stevens, Alexander H.*
 1906 *Stevens, Arthur W.*
 1879 *Stevens, Frederic W.*
 1901 *Stevenson, Edward Luther, Ph.D.*
 1905 *Stewart, John H. J.*
 1887 *Stewart, Lisenard.*
 1878 *Stewart, William Rhineland.*
 1901 *Stickney, Charles D.*
 1905 *Stillwell, Arthur E.*
 1905 *Stillwell, Louis Buckley.*
 1897 *Stine, Marcus.*
 1904 *Stokes, Anson Phelps.*
 1892 *Stokes, I. N. Phelps.*
 1911 *Stokes, J. G. Phelps.*
 1884 *Stokes, James.*
 1889 *Straus, Isidor.*
 1903 *Strauss, Frederick.*
 1906 *Strong, Charles Hamot.*
 1904 *Strong, George A.*
 1904 *Stuck, Rev. Hudson.*
 1873 *Sturges, Frederick.*
 1875 *Sturges, Henry C.*
 1906 *Sturges, Rush.*
 1873 *Sturgis, Frank K.*
 1901 *Sturgis, Thomas.*
 1891 *Suckley, Robert B.*
 1887 *Sutton, J. Ford, D.D.*
 1903 *Sutton, James F.*

Date of Election.

1893 Swayne, Francis B.
 1906 Sweet, Henry N.
 1905 Swords, Henry C.
 1882 *Tailer, Edward N.*
 1906 *Talbot, Fritz B., M.D.*
 1877 *Talcott, James.*
 1889 Tatham, Charles.
 1902 Taylor, Charles H., Jr.
 1868 Taylor, Douglas.
 1906 Taylor, Ellsworth M.
 1906 Taylor, Frank B.
 1895 Taylor, George.
 1903 Taylor, Henry R.
 1901 Taylor, Walter C.
 1882 *Terry, John T.*
 1876 *Terry, Rev. Roderick.*
 1911 Thain, Charles C.
 1883 Thalmann, Ernest.
 1891 Thaw, Benjamin
 1905 *Thebaud, Paul G.*
 1905 *Thomas, William S., M.D.*
 1898 Thompson, D. W.
 1904 *Thompson, Mrs. Frederick F.*
 1901 *Thompson, Lewis S.*
 1911 *Thompson, Robert M.*
 1898 Thompson, Walter.
 1902 *Thomson, Elihu.*
 1886 Thorne, Jonathan.
 1890 Thorne, Samuel.
 1911 Thorne, Samuel, Jr.
 1891 *Tobey, Gerard C.*
 1911 Tobey, Orville H.
 1906 Townsend, Edwin S.
 1900 Tracy, J. Evarts.
 1911 *Tuck, Edward.*
 1899 *Tucker, George F.*
 1901 *Tuckerman, Alfred.*
 1908 Tuckerman, Bayard.
 1901 Tuckerman, Paul.
 1900 Turnure, George E.
 1909 Tweed, Charles H.
 1911 *Udall, John Clark.*
 1905 Uhle, John B.
 1905 Ulich, H. P.
 1891 Ullmann, Emanuel S.
 1891 Ulmann, Ludwig.
 1897 *Underhill, Eugene.*
 1910 Vail, Theodore N.
 1906 *Vaile, Joel F.*

Date of Election.

1887 *Van Alen, J. J.*
 1897 Van Antwerp, William C.
 1908 Van Boskerick, Miss Lizzie.
 1907 Van Cortlandt, Robert B.
 1889 *Vanderbilt, George W.*
 1878 *Vanderbilt, William K.*
 1906 Van Dusen, Dr. James Wallace.
 1910 Van Gerbig, Barend.
 1902 *Van Rensselaer, A.*
 1905 Van Sinderen, Howard.
 1887 *Van Slyck, George W.*
 1891 *Van Winkle, Edgar B.*
 1906 Veeder, Curtis H.
 1903 Veit, Richard C.
 1900 *Vetter, Dr. Charles.*
 1909 Viquez, Cleto Gonzalez.
 1901 von Briesen, Arthur.
 1875 *von Post, Herman C.*
 1903 von Schmid, J. O.
 1907 Wack, Henry Wellington.
 1890 *Wadsworth, Herbert.*
 1898 *Wadsworth, Wm. Austin.*
 1898 Wait, William B.
 1908 Walker, Amasa.
 1900 Walker, Henry Freeman, M.D.
 1905 Wallace, Dillon.
 1898 Warburg, Felix M.
 1911 *Warburg, Paul M.*
 1905 Ward, John Gilbert.
 1911 Warner, George H.
 1895 Warren, William R.
 1909 Wasson, Rev. Dr. James B.
 1889 Waterbury, John I.
 1911 *Waterman, Frank D.*
 1898 *Watkinson, George.*
 1884 *Watson, George H.*
 1876 Wedemeyer, A. J. D.
 1911 *Weekes, F. Delano.*
 1900 *Wehrhane, Charles.*
 1903 *Weir, Col. John.*
 1895 Wells, Charles W.
 1905 *Wells, Mrs. John.*
 1905 Wells, T. Tileston.
 1907 Wentz, Theodore.
 1910 Wemyss, Miss Henrietta C.
 1898 Weston, Edward, Sc.D., LL.D.
 1906 Weston, Frederick W.
 1888 Wetmore, Edmund.
 1874 *Wetmore, George P.*

Date of Election.

- 1901 *Wetmore, W. S. K.*
 1872 *Wetmore, William Boerum.*
 1905 *Wheeler, John Davenport.*
 1906 *Wheeler, Samuel H.*
 1907 *Whinery, Charles C.*
 1905 *Whitaker, John E.*
 1887 *White, Alfred T.*
 1887 *White, Henry.*
 1887 *White, J. LeRoy.*
 1886 *White, S. V.*
 1887 *White, William Augustus.*
 1905 *White, William H.*
 1901 *Whitehouse, William FitzHugh.*
 1891 *Whitney, Milton B.*
 1902 *Whitney, W. Beaumont.*
 1908 *Wickersham, George W.*
 1901 *Willets, Howard.*
 1900 *Willets, John T.*
 1882 *Williams, David.*
 1902 *Williams, John Skelton.*
 1911 *Williams, Dr. M. B.*
 1906 *Williams, Richard H.*
 1901 *Williams, Timothy S.*
 1893 *Wills, Charles T.*
 1903 *Wilson, Henry R.*

Date of Election.

- 1870 *Wilson, Gen. James Grant.*
 1909 *Wilson, M. Orme.*
 1875 *Winslow, Gen. Edward F.*
 1901 *Winslow, John Flack.*
 1902 *Winter, Emil.*
 1900 *Winthrop, Grenville L.*
 1888 *Witherbee, Frank S.*
 1891 *Wolcott, Henry Roger.*
 1897 *Wolff, Emil.*
 1909 *Wolff, M. A.*
 1905 *Wood, Henry A. Wise.*
 1903 *Wood, Henry R.*
 1911 *Wood, William C.*
 1898 *Woods, Edward A.*
 1906 *Worrall, Charles Addams.*
 1904 *Wright, J. Dunbar.*
 1886 *Wright, William Phillips.*
 1907 *Wunderlich, Frederick W., M.D.*
 1902 *Wyckoff, Clarence F.*
 1902 *Wyckoff, Edward G.*
 1901 *Wyckoff, William F.*
 1905 *Yeisley, George C., D.D.*
 1884 *Zabriskie, Andrew C.*
 1898 *Zaring, Charles W.*
 1905 *Zickel, S.*

GEOGRAPHICAL RECORD

AMERICA

NEW MONTHLY CLOUDINESS CHARTS FOR THE UNITED STATES. In 1891 Gen. A. W. Greely, Chief Signal Officer of the Army, published the first set of monthly cloudiness charts for the United States (Washington, D. C., *fol.* 1891). The longest period for which data were then available was 18 years (1871-1888), and many stations had records for shorter periods, some for less than 5 years. In the "Report of the Chief of the Weather Bureau for 1896-97" there was later published a mean annual cloudiness chart on the basis of more data and of longer records. Mr. Kenneth McR. Clark, a student of Harvard University, has now constructed a new set of cloudiness charts (monthly and annual), which are reproduced, with a brief discussion, in the *Quarterly Journal* of the Royal Meteorological Society for April, 1911. Data for 77 stations have been used, at which averages are based on periods of 30 years or more. There were also 31 stations with periods of less than 10 years, and 15 with 5 years or less. The short-period stations were given less weight than the longer-period stations; some stations were omitted because of local topographical influences upon their cloudiness, and some long-period stations were given less weight when their data differed considerably from those of surrounding stations.

The most marked features appear over the Pacific Coast and the Great Lakes.

On the North Pacific Coast the combined effect of the Coast Ranges and the on-shore westerly winds causes a high percentage of cloudiness, especially in winter, when the northern storm track swings down over this region. The Great Lakes region shows a similar large amount of cloudiness, especially in the winter, because of its location on or near the northern cyclonic tracks and because of the presence of the water surface. The California Valley, protected from moisture-bearing winds by the Coast Range, shows the minimum cloudiness for the country.

R. DEC. WARD.

CLIMATE OF PUGET SOUND BASIN. Buried away in a "Reconnaissance Soil Survey of the Eastern Part of the Puget Sound Basin, Washington (U. S. Dept. of Agric. Bur. of Soils; Field Operations, 1909. Washington, D. C., 1911) there is a short account of the climate of the region, prepared by Professor E. J. Saunders, of the University of Washington. The discussion consists of twelve pages of text, together with sketch maps showing annual precipitation, average monthly precipitation, number of clear days and number of days with rain, average lowest and highest temperatures, and average dates of first and last frost. It is a satisfaction to note (p. 26) the following statement: "Many have ascribed this equable climate to the Japan Current, but—the prevailing westerly winds, the cyclonic storms, and the condensation of moisture are the chief factors in causing these conditions. Changes of climate have also been explained by changes in the position of the Japan Current. In the first place, no permanent change of climate is shown by the records, and any slight differences . . . between two winter seasons, or two summer seasons, or different months, can be easily accounted for by irregular variations in the path of the cyclonic storms which pass over the area."

R. DEC. WARD.

SOME RESULTS OF RECENT ANTHROPOLOGICAL EXPLORATION IN PERU. Dr. Ales Hrdlička, Curator of the Division of Physical Anthropology, U. S. National Museum, visited the coast of Peru during the summer of 1910 and secured some unlooked-for anthropological results. He examined over thirty ancient cemeteries and collected upwards of 3,400 crania and other skeletal remains. A large part of the crania were free from artificial deformation. His work was confined to the two most important districts on the coast, Pachacamac and Chan-chan or Gran Chimú.

With this material and the collections from Ancon and other places on the Peruvian littoral, it is now possible to learn definitely the physical characteristics of the population of the Peruvian coasts for a distance of over 400 miles, and establish a firm foundation for anthropological comparisons for the rest of the country. From the preliminary examination of the material it may now be positively stated that the whole coast of Peru at least from Pisco to Pacasmayo was peopled by one and the same type of natives, the brachycephalic Indian of moderate stature. The earliest people were followed by others of the same fundamental physical type, but of modified habits shown in part by the pronounced occipital head flattenings which indicate the use of cradle-boards to which the infant was tied for a long period. Belonging to this period are large cemeteries in which the graves yield copper or bronze, with some gold and interesting pottery. The brachycephalic people seem to have been the first inhabitants of the coast, for there was absolutely no trace of any previous occupants, and the peopling of the coast by the brachycephals, judging from the nature and extent of the cemeteries, could not have been of very great duration, not over some centuries before the arrival of the whites.

This old type of the coast people is fundamentally the same as a large portion of the inhabitants of Ecuador, Colombia, Panama, Central America and Yucatan. The present native population was seen by Dr. Hrdlička to show this type as far as the southern confines of the Peru of to-day. Farther southward; however, at Arica and along the Chilean coast, there is an increasingly large proportion of dolichocephalic natives, and from the northern extremity of the central part of the Chilean coast southward this latter type is the only one encountered. (*Smithson. Misc. Coll.*, Vol. 56, 1911, No. 16.)

ATLANTIC TERMINAL DOCKS ON THE PANAMA CANAL. A plan for terminal facilities at the Atlantic entrance of the Canal has been approved. It consists of a series of five reinforced concrete docks at which ten 1,000-foot vessels, or twenty vessels of the type now in the Isthmian trade, may tie up at one time and take on or discharge cargo. Borings are now being made to determine the nature of the material underlying the water at this place. The estimated cost of the series of five docks is \$7,811,666. (*The Canal Record*, Vol. 4, No. 40, 1911.)

POPULATION OF MEXICO. The census enumeration in Mexico, in October, 1910, gives the Republic a population of 15,063,207, an increase of 10.7 per cent. since the last census, and a density of 8 to the square kilometer.

AFRICA

THE MATADI-LEOPOLDVILLE R.R. This railroad is the sole connecting link between the upper and the lower Congo. The traffic is becoming so large that measures are about to be adopted for improving the line. It has recently been examined by a Belgian engineer with a view to using electricity as the motive power to be derived from the Congo cataracts. Another scheme under consideration and which, it is believed, will soon be adopted, is the laying of a pipe between Matadi and Leopoldville for supplying steamers on the upper river with crude petroleum to take the place of wood fuel. It is proposed, at the same time, to substitute liquid fuel for coal and briquettes on the locomotives. It would thus be possible to accelerate both the railroad and steamer services between the lower Congo and the upper reaches of the river, where wood fuel is becoming scarce at the stopping places. Oil depots would be established along the railroad and the river.

THE MADAGASCAR RAILROAD. The railroad which, for some years has been in operation between Tananarivo, the capital of Madagascar, and Brickaville (169 miles), is being extended from its present eastern terminus at Brickaville to the port of Tamatave, a distance of sixty miles. It is expected that the extension will be completed in 1913, when the capital will be connected by rail with the most important port of the island. (*Bd. of Trade Journ.*, July 6, 1911.)

COTTON GROWING IN THE BRITISH EMPIRE. The *Report* of the British Cotton Growing Association for 1910 says that in that year the amount of baled cotton produced in the British colonies was 32,900 bales of 400 lbs. each. The crop of 1908 was 22,300 bales. About three-fourths of the total is produced in the African Colonies, Uganda producing 12,000 bales and the country tributary to Lagos 6,000 bales. Northern Nigeria, which is supposed to be the greatest future reserve in the British colonies of cotton production, yielded only 400 bales. Not until the railroad now building is extended through the large cotton area of that region will the receipts from Northern Nigeria be important.

ASIA

STEAMSHIP SERVICE ON THE AMUR AND SHILKA RIVERS. The Russian Government has empowered the Minister of Ways of Communication to organize, for a period of six years from 1911, a subsidized regular passenger and postal steamship service on the rivers Shilka and Amur between Stretensk on the Shilka and Nicolaievsk at the mouth of the Amur, a distance of about 2,000 miles. The steamship company undertaking this service must guarantee to make not less than thirty-two regular sailings yearly and must maintain not less than seven steamers on the service. (*Board of Trade Journ.*, May 25, 1911.)

EUROPE

POPULATION OF THE AUSTRIA-HUNGARIAN MONARCHY. The census of Dec. 31, 1910, shows a population for the Monarchy of 51,304,249, with a density of 76 to the square kilometer. The population of Austria is 28,567,898; Hungary, 20,840,678; Bosnia-Herzegovina, 1,895,673. The increase in population since the last preceding census of Austria is 9.2 per cent.; of Hungary, 8.34 per cent.

POPULATION OF SPAIN. The population of Spain, according to the census of Dec. 31, 1910, is 19,503,068, including the Canary Islands. The increase in population since the last preceding census was 4.81 per cent. Density, 39 to the square kilometer.

BRITISH CLIMATOLOGY. "The Present Position of British Climatology" formed the subject of the address of Henry Mellish, President of the Royal Meteorological Society, delivered at the meeting of January 18, 1911, and published in the *Quart. Journ. of the Roy. Meteor. Soc.* for April, 1911. At the end of this address there is a bibliography which contains the more important articles on the subject, and which will prove useful to those who are investigating British climatology.

R. DEC. WARD.

THE FÖHN WIND AT INNSBRUCK. First-hand descriptions of meteorological phenomena possess obvious advantages over dry, summarized descriptions of the general characteristics of such phenomena. A vivid account of the föhn winds of Innsbruck, by a "resident of Innsbruck," recently published (*Symons's Met. Mag.*, Feb., 1911), emphasizes in a very striking way the relations of this interesting wind to man. So common is the föhn at Innsbruck that it is *the* wind, in the minds of the inhabitants. "Es geht wieder der Wind" is the popular expression when the well-known gusts begin. Windows and doors are then closed to keep out the clouds of dust. Headache, lassitude, depression are the symptoms which many persons experience regularly just before or during the coming of the föhn. Innsbruck has, on the average, forty-three days of föhn, each year, distributed as follows:

JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	YEAR
3.1	3.4	6.0	5.9	5.1	1.5	2.2	1.4	2.0	4.6	4.3	3.0	42.5

The spring and autumn have the most föhn winds. The numbers of days' duration of these winds, as shown by twenty-five years of observation, are shown in the following table:

Days of föhn.....	1	2	3	4	5	6	7	8
No. of times.....	214	170	61	29	22	5	4	2

Thus, a föhn wind of one day's duration occurred 214 times in twenty-five years, while one of eight days' duration occurred only twice.

An interesting relation to the popularity of Innsbruck as a winter resort is brought out in the fact that the frequent occurrence of this wind in spring is a serious blow to ski-running. While the "Schneefresser" is welcome to the peasants in the high valleys, as melting the snow and moderating the severity of the winter cold, the ski-runner and the skater look upon the föhn with very different eyes. The wind often lasts longest on just those heights where most of the ski-running takes place. The relation of this remarkable wind to vegetation is brought out in the same article. Maize can be raised at Innsbruck because of the moderating influence of these warm winds. A further interesting feature "is the survival in the Inn Valley, near Innsbruck, of floral types from the inter-glacial period, which succeeded the great Ice Age. It is owing to the mild temperature set up by the föhn that these relics of a semi-tropical vegetation have been enabled to continue their existence in their present environment."

R. DEC. WARD.

PACIFIC OCEAN

THE TERRA NOVA AS A SURVEY SHIP. After conveying Capt. Scott and his Antarctic Expedition to their bases of operations in South Victoria Land and King Edward VII Land, the Polar exploring vessel *Terra Nova* returned to New Zealand, where she was chartered by the government for survey work. In July she sailed from Christchurch for the northern coast of North Island and will work between that coast and the Three Kings Islands lying thirty-eight miles northwest of the mainland. These off-shore soundings will be taken to delimit the hundred fathoms line, and shoal soundings will also be made between the islands and the mainland. The results will be of great value to the shipping world, and especially to steamers approaching the North Island from the westward. The work will occupy the *Terra Nova* about three months. In October she will return to Lyttelton to prepare for her next voyage to South Victoria Land. (*London Times*, Weekly Edition, p. 423, 1911.)

FUR SEAL TREATY SIGNED AT WASHINGTON. This treaty between England, Russia, Japan and the United States was signed on July 7, and these countries have now composed their long-existing differences on this subject. The old common-law limitation of three miles from shore is abolished, and no fur seals are to be killed in the North Pacific Ocean, including the seas of Bering, Okhotsk, Kamtchatka and Japan. Provision is made for the maintenance of a patrol of the seal waters by representatives of all the nations concerned. The agreement is to hold for fifteen years, and as long thereafter as no one of the governments denounces it.

PHYSICAL GEOGRAPHY

THE DEEPEST BORING. According to the *Geographische Zeitschrift* (Vol. 7, No. 4, pp. 228-9), the deepest boring yet made is at Czuchow in the Rybnik district of Silesia. It has reached a depth of 7,349 feet beneath the surface. The boring was begun ten years ago, and its diameter near the surface of 1.41 feet was considerably reduced with increasing depth. The temperatures at the various depths are of much interest. At 1,971 feet, the temperature was 82.4° F. From this point to 2,294 feet, the temperature increased very slowly and irregularly. At 3,806 feet, 122° F. was recorded; at 4,156 feet, 140°; at 5,193 feet, 150.8°; at 6,855 feet, 176°. There was an average increase of 1.8° F. in

temperature for every 104 feet of depth attained. At the same rate of increase, the heat at 9,000 feet would be about the boiling point of water. As heat determinations have not been made at greater depths it is, of course, impossible to say what the rate of increase may be below the point attained.

A LAYER OF SAND RAISED ABOVE WATER LEVEL BY GASES. The formation of an island, due to an unusual cause, is reported in the April number of the *Zeitsch. der Gesells. für Erdk.* of Berlin. On Oct. 23, 1910, an island, 230 by 100 feet in dimensions, appeared on the surface of the Ögel Sea, a small lake near Beeskow in the province of Brandenburg. The investigations of Prof. Potonié, the botanist, showed that it owed its origin to the buoyancy of gases. The lake originally did not drain into the Spree River. Its depth amounted to about 100 feet, which was gradually decreased to 13 feet by the accumulation of decomposed vegetable and calcareous matter. Subsequently a connection was established between the lake and the Spree. This resulted in the deposition of a stratum of sand, which gradually accumulated to such a degree that the gases forming in the mud at the bottom of the lake could no longer escape. The pressure of the gas finally became so great that it was able to raise the layer of sand above the level of the water, thus creating an island. Mud flowed into the void caused by the uplifting of the sand stratum. The island is thus not a floating island, as has been proved by boring.

PERSONAL

PROF. W. M. DAVIS TO BE EXCHANGE PROFESSOR IN PARIS. The newly arranged exchange of professors between Harvard University and the Ministry of Public Instruction in France goes into effect this winter for the first time. Prof. Diehl of the Sorbonne comes to Harvard to lecture on Byzantine history; Prof. W. M. Davis of Harvard goes to Paris to lecture on physical geography. This is Prof. Davis' second term of educational service abroad, as in the winter of 1908-09 he was exchange professor at the University of Berlin. His residence there was preceded by an informal international excursion across northern Italy and into southeastern France, attended by professors and students of geography in numbers varying from four to forty or more. A similar excursion for this summer has been arranged in coöperation with Dr. Fr. Nussbaum of Bern, a member of the party in 1908. The excursion will take the form of a "geographical pilgrimage to Rome," beginning in Ireland in late July, continuing with varying membership across England, France and Switzerland, and arriving in Italy in time to take part in such excursions as may be there planned to precede the International Geographical Congress in Rome, Oct. 15-22. Prof. Davis will return from Rome to Paris, and conduct his work at the Sorbonne through the winter semester, Nov. 3 to March 15. His special subject will be the Forms of the Lands, presented in lectures to less advanced students, and in practical exercises to more advanced students.

Prof. H. E. Gregory of Yale University is continuing this summer his study of the water supply and economic resources of the Navajo Reservation for the U. S. Geological Survey. His assistants are Prof. W. R. Barrows and Messrs. K. C. Heald and H. F. Robinson, the latter irrigation engineer of the Indian Service.

Prof. F. W. Sargeson, of the Department of Geology, University of Minnesota, has been appointed geologist on the U. S. Geological Survey. He will complete

the areal, stratigraphic and glacial geology of the Minneapolis, St. Paul, Anoka and White Bear Quadrangles and prepare for publication a folio descriptive of this region.

OBITUARY

PROF. SAMUEL CALVIN. Prof. Calvin, head of the Department of Geology, State University of Iowa, and State Geologist of Iowa, died at Iowa City on April 17. He was 71 years old and had been connected with the university for thirty-seven years.

EDWIN E. HOWELL. Mr. Howell died at his home in Washington on Easter Sunday. He was born on March 12, 1845, in Genesee County, N. Y. For three years he was a geologist of the Wheeler and Powell surveys, making geological reconnaissances in Utah, Nevada, Arizona and New Mexico. The important work by which he is best known was the modelling of relief maps in which he was a pioneer. Many museums and schoolrooms throughout the country have specimens of his plastic representations of physiography, topography and geologic structure.

GENERAL

AERONAUTICS AND CLIMATE. That the development of the art of flying is very closely dependent upon a more accurate knowledge of meteorological conditions is obvious to anyone who stops for a moment to consider the use of aeroplanes and balloons. Some of the best studies of the winds of Germany, recently published, were distinctly undertaken for the purpose of benefiting aerial navigation. The whole matter is one which is certain to attract a rapidly increasing amount of attention. A writer in the *New York Nation* (June 9, 1911), under the title "Problems of the Air," emphasizes the meteorological, and even the larger climatic relations of the aerial navigation of the future. Of the three important basic problems which must be dealt with before aerial navigation can become a well-established art, two are meteorological, *viz.*, a thorough investigation of the behavior of moving "planes" in the air, and the mapping of the air regions over the principal countries of the world, or at least along the principal air lines. The mapping of the air is most essential. Every aviator has had experience with the currents and counter-currents, air walls and precipices. "The men who crossed the English Channel," says Waldemar Kaempffert in his book, "The New Art of Flying," "found that against the chalk cliffs of Dover a vast invisible surf of air beats as furiously as the roaring visible surf in the Channel below." There are, also, some large climatic controls over aviation which the writer of the same article clearly points out. "Natural conditions," he says, "are more favorable to air flight in France than in any other European country. Her more equable climate, her greater amount of sunlight as compared with Germany or England, must be taken into consideration. In the rather random speculation regarding the possibilities of war in the air, little attention has been paid to this advantage which one country may enjoy over another. In England, with its rain and fog, the military air-ship in the future can count only on so many days' activity during the year. In Germany, the range is probably wider. In France it is wider still." R. DEÇ. WARD.

GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY)

BOOK REVIEWS AND NOTICES

(The size of books is given in inches to the nearest half inch.)

AMERICA

Madison: A Model City. By John Nolen. 168 pp., maps and illustrations. Madison Park & Pleasure Drive Association, Boston, 1911. 10½ x 7½.

The title does not mean that the capital of Wisconsin is now a model city, but the purpose is to examine the city as it is with a view to noting its merits, defects and tendencies, and then to suggest a comprehensive programme of definite measures that may be taken to bring about the desired improvements. The author is a "Landscape Architect" of Cambridge, Mass., who was employed by the Directors of the Madison Park and Pleasure Drive Association and a Citizens' Committee of fifty to prepare a plan for the future growth and development of the city. This book is Mr. Nolen's report on present conditions and recommendations for improvement. His suggestions embrace street widening, the securing for public use of the most important of lake frontages, the improvement of railroad approaches, the removal from streets of all wires, poles and other obstructions, systematic planting and maintenance of street trees, reorganization of park work and extension of parks and open spaces, improvement of the housing of persons of small means, and many other features. There are numerous photo-engravings and descriptions of various phases of city improvement at home and abroad which Mr. Nolen believes may be introduced to advantage in Madison. The volume is well worth the study of a much larger public than that for which it was especially prepared.

Argentina and Her People of To-day. An account of the Customs, Characteristics, Amusements, History and Advancement of the Argentinians, and the Development and Resources of their Country. By Nevin O. Winter. xiv and 421 pp., map and illustrations, appendices and index. L. C. Page & Company, Boston, 1911. \$3. 8 x 5½.

This would make good enough newspaper travel talk and has a hundred pages of history at the end that are good reading. For the rest it is worth little. The writer has aimed "to present a complete treatise upon the country," but one fears he has not the necessary training. Statements are made so recklessly that no data in the book may be trusted. The author says Argentina has a "half billion acres of fertile arable land," but the Statesman's Yearbook says "253,195,000 acres may be used for agricultural or cattle industries" (my italics). "The winter temperature resembles that of the Ohio Valley." Yes: as 55° resembles 35°, unless he is talking of the Straits of Magellan. Of the dry pampa we are told (p. 81) that "water is, however, not far below the

surface." Entirely untrue for vast areas. Argentine "ranks third in wheat." The last Year Book of the United States Department of Agriculture, out when the author wrote, gave the millions of bushels for 1908 as: United States, 737; Russia, 711; France, 356; India, 283; Italy, 165, and Argentina, 162. The International Institute of Agriculture at Rome, for the crop of 1910-11, puts Germany, Spain, Hungary and Canada also above the Argentine Republic; for the previous year all of them but Hungary. Cattle and corn are nearly as much misrepresented. Argentine sheep, he says, would form a solid column of twos all the way from New York to San Francisco! As a matter of fact, they would make a column of twelves! Calle Reconquista (Reconquest Street), reminds us that the British (p. 19) *succeeded* in their attempt to capture the city of Buenos Ayres in 1805. Patagonia was divided, not "a few years ago," but in 1881. The rain of fish (p. 90) in the Chaco doubtless refers to the *Lepidosiren* buried in the mud through the dry season (*Bulletin*, June, 1911, p. 458). The pictures are well selected.

MARK JEFFERSON.

Le Brésil au XX^e siècle. Par Pierre Denis. Deuxième Édition. 307 pp. Librairie Armand Colin, Paris, 1909. F. 3.50.

The book is much more than a geography (and a first-class one, too) of Brazil; politics and economics are dwelt on as thoroughly as geography, while the relations to geographical conditions are laid open everywhere. For one who wants to learn "all about Brazil" in the shortest and most instructive way, no better book can be imagined. Here are some of the pertinent facts it contains:

Among the young countries of the American continents, Brazil belongs to the comparatively old ones, looking back on a history and traditions of three hundred years of white occupation. This is due principally to the location of northern Brazil in the tropics, which made it one of the countries fit for the production of sugar cane. The plantation system which belongs to that culture developed an aristocratic society of pure Portuguese descent, which, to this day, keeps strictly apart from the laboring classes of colored or mixed blood in a way not common in tropical America. In southern Brazil this distinction is not found, because the temperate climate allowed the settlement by white immigrants from Europe. Among the large cities of Brazil, Rio de Janeiro has, therefore, a character of its own for having been a colonial metropolis long before it became a modern capital.

This difference in the origin of the settlers of the northern and southern states of the republic accounts for some differences in their character and customs. The Portuguese class of the north still hold the larger part of the rural property, and this fact, in a country so preëminently agricultural, means the possession of a large portion of the national wealth and of political influence. That class has preserved the aristocratic, cultured and hospitable traditions of the colonial past, but it has not, on the other hand, remained immune against that influence of rural isolation which tends to produce indifference to matters outside one's immediate sphere of interest. The political and business life is, therefore, much more active in the southern states, where wealth and property are of more recent origin, and where the men of influence belong to the second and third generations.

The lower classes are immigrants everywhere. In São Paulo, the Italians form a fluctuating population of plantation hands in the coffee districts. In the other states of the south the absence of plantations obliged the foreigners to go

out into the wilderness as pioneers of civilization. It is there that they have formed those foreign settlements in which, owing to the isolation of the country, they have preserved their German, Polish and Morbihan-French customs and languages. In the tropical north, it is the descendants of the former slaves who furnish plantation hands in the sugar cane regions, and in the rubber districts season laborers are supplied through an interesting domestic immigration. They are inhabitants of the province of Ceára, a race of Portuguese-Indian half-breeds, who are cowherds in their own country, but, in times of drought, earn their living as harvest hands in the Amazon basin, and thus form a steady supply of labor which, although not African, is used to the climate, and which is never exhausted either, as the Ceáreans are a very prolific race.

Urban populations are found only in Rio, São Paulo, and a few other large cities. Even there they can hardly be called native, as the majority are foreign merchants who live there for the sake of business, and who leave the country as soon as their fortunes are made. The only exception from this rule are the Portuguese, who, speaking the language of the country, are more inclined to found permanent homes there.

Topographically, Brazil consists of three parts: the coast, the plateau country back of it, and the central depression which belongs, in the north, to the Amazon basin, and in the south, to that of the Paraná. The salient feature in the political geography is, that the western boundary includes that depression in the north only, while in the south it runs along the border of the plateau, leaving the basin foreign territory. The escarpment of the plateau on the Atlantic side forms the Serra do Mar and the Serra Ceral. It extends far toward the south, attracting thither, by virtue of its elevation, the equatorial rainfall, which explains that "Serra" is the equivalent of "Forest." The forests are especially favored by the occurrence of a certain kind of diabase soil, so that to a certain degree the geological composition of the soil can be determined from a forest map. Contrary, therefore, to the German word "Wald," which, while meaning forest, is often used to designate a range of mountains, the word "Serra" in Brazil, while originally meaning a range of mountains, is very generally used to designate large tracts of forest. This explains why, on many maps of Brazil, mountain ranges have been found where the real country shows no trace of them; in all these cases it is a wooded country that misled the cartographer, by means of its name, to suppose that a mountain range was there.

The coastal Serras have not, like their seeming counterpart, the Appalachians, acted as a barrier to settlement. For, unlike the coastal plain of North America, that of Brazil is so unhealthy that the colonists could not found any permanent settlements there. They were thus obliged to penetrate into the hinterland at an early date, so that the plateau was opened up much more rapidly than the coast. The visitor from abroad is very much mistaken when, on arriving at the coast, and seeing the skyline of, as it were, virgin forest, which rises back of the coastal plain, he supposes that Brazil ends there. For the real Brazil only begins back of the Sierra, because the plateau contains the larger, as well as the most stable part of the population, while that of the coast is foreign and fluctuating.

Aside from its commercial function, the coast also acts as a highway between the different provinces, for the rivers of Brazil, in spite of their large sizes, are navigable only on certain reaches, and Porto Alegre, on the Rio Grande, is about the only place where a couple of navigable waterways converge. This

fact must not be overlooked when considering the prosperity of the German colonies in that neighborhood.

The country roads of Brazil are as poor as they are old, and some of them are very old. They would not be recognizable to-day were it not for the alignment along their former courses of farms and hamlets whose existence would be unintelligible to one not knowing that once upon a time a road was running by there. The doom of the roads was caused by the railroads because, as soon as the government began to build the latter, it ceased to take care of the former. The monopoly of the railroads in Brazil is, therefore, as complete as it is in the American West, and it has produced the same rate and tariff conditions as on the northern continent.

The most conspicuous feature in the recent development of Brazil is the shifting of economical leadership from the tropical to the temperate states, from Bahia and Pernambuco to São Paulo, from sugar and rubber to coffee. In this process, too, geographical influences have been at work. It is the above-named diabases whose detritus produces the "violet" soil especially suited for coffee, and the State of São Paulo is fortunate enough to possess plenty of that soil. There was a period in the early history of the state in which the hunt for violet soil was as lively as was the hunt for gold in the Far West. At that time—soon after the Civil War—a strong immigration set in, not only from Europe, but also from the United States, and many Southerners who had lost everything in the war, tried to begin life over again on the violet soil. By the side of Nova Fribourg and Nova Helvetia, Villa America has remained as a permanent witness of that period.

The present prosperous condition of that state ought, however, to be safeguarded against two imminent dangers: first, the exclusive devotion to one product, and a product for exportation only; for coffee is king in São Paulo, as cotton was in the old South. Secondly, the impossibility for the small property to hold its own against the overwhelming influence of the large land-owners. In the more southern states where coffee does not reign supreme, the small property dominates, and the foreign colonies of those states produce everything they need, and would be able even to export a large part of their abundance if there were only good markets for their products, or convenient connections with such markets at their disposal.

M. K. GENTHE.

AFRICA

Siwah. Die Oase des Sonnengottes in der libyschen Wüste. Von J. C. Ewald Falls. 48 pp. and 25 illustrations. Verlag von Kirchheim & Co., Mainz, 1910. Mk. 2. 10½ x 7½.

This is the latest of three reports on the Siwa Oasis published within the past four years. It does not attempt to compare with the two preceding studies in thorough scientific treatment. The Khedive of Egypt five years ago crossed the Libyan waste as far as the Siwa Oasis, the first ruler to make this journey since Alexander the Great in 332 B. C. Mr. Falls, a German scholar, participated in the expedition and has written for the general public this account of the journey and description of the famous Oasis of Jupiter Ammon. His first chapter is given to the Khedival caravan route, which largely coincided with that of Alexander the Great. In the second chapter he describes the oasis and its culture, its industries, commerce, flora and fauna. The town of Siwa and its widespread monuments of earlier days are sketched in the third chapter,

and he concludes with a brief account of the geology of the region. Incidentally, he throws some interesting light on the characteristics of the Khedive, who is certainly to be admired for his earnest efforts to see for himself some of the more remote parts of his land. The illustrations are admirable and instructive, but there is no map.

NEW MAPS

EDITED BY THE ASSISTANT EDITOR

MAPS ISSUED BY UNITED STATES GOVERNMENT BUREAUS

U. S. GEOLOGICAL SURVEY

TOPOGRAPHIC SHEETS:

Alaska. Reconnaissance Map of Yukon-Tanana Region, Alaska. Circle Quadrangle. Alaska Sheet No. 641. 1:250,000 (1 in.=3.95 miles). (66°-64° N.; 146°-142° W.). Contour interval 200 ft. Datum is mean sea level, assuming an elevation of 810 ft. at Eagle. Surveyed in 1903, 1904, 1905 and 1908. Edition of May 1911. [Delineation of topography in the N. E. corner of the sheet does not extend beyond the Yukon.]

Arizona-California. Parker Quadrangle. 1:125,000 (1 in.=1.97 mile). (34°30'-34°0' N.; 114°30'-114°0' W.). Interval 50 ft. Surveyed in 1902-03 and 1909. Edit. of March 1911.

Illinois. Hennepin Quad. 1:62,500 (1 in.=0.99 mile). (41°30'-41°15' N.; 89°30'-89°15' W.). Interval 20 ft. Surveyed in 1909. Edit. of April 1911.

Kentucky. Dawson Springs Quad. 1:62,500. (37°15'-37°0' W.; 87°45'-87°30' W.). Surveyed in 1909. Edit. of May 1911.

Maryland. Prince Frederick Quad. 1:62,500. (38°45'-38°30' N.; 76°45'-76°30' W.). Interval 20 ft. Surveyed in 1890, revised in 1900 and 1904-05. Edit. of May 1910.

Maryland-Pennsylvania. Emmetsburg Quad. 1:62,500. (39°45'-39°30' N.; 77°30'-77°15' W.). Interval 20 ft. Surveyed in 1908-09. Edit. of March 1911. [Names of townships printed from type.]

Maryland-Pennsylvania. Taneytown Quad. 1:62,500. (39°45'-39°30' N.; 77°15'-77°0' W.). Interval 20 ft. Surveyed in 1908-09. Edit. of Feb. 1911. [Names of townships printed from type.]

Michigan. Calumet Special Map. 1:62,500. (47°26'-47°7' N.; 88°37'-88°18' W.). Interval 20 ft. Surveyed in 1908-09. Edit. of May 1911.

New York. Monticello Quad. 1:62,500. (41°45'-41°30' N.; 74°45'-74°30' W.). Interval 20 ft. Surveyed in 1908-09. Edit. of May 1911.

Virginia-Tennessee-North Carolina. Abingdon Quad. 1:125,000. (37°0'-36°30' N.; 81°45'-81°30' W.). Interval 50 ft. Surveyed in 1908-09. Edit. of April 1911. [Names of counties printed from type.]

West Virginia. Peytona Quad. 1:62,500. (38°15'-38°0' N.; 81°45'-81°30' W.). Interval 50 ft. Surveyed in 1908-09. Edit. of April 1911. [Names of counties printed from type.]

Maps in U. S. G. S. Bulletins

ALABAMA. Map and Sections of the Southern Part of Cahaba Coal Field, Alabama. By Charles Butts. Scale of map and of sections 1:114,000 (1 in.=1.80 mile). 33°14'-33°0' N.; 87°15'-86°53' W.) Black. With inset showing general location. Accompanies, as Pl. IV, *Bull.* 431, 1911.

ALASKA. [Five maps accompanying "A Geologic Reconnaissance in South-eastern Seward Peninsula and the Norton Bay-Nulato Region" by P. S. Smith and H. M. Eakin, *Bull.* 449, 1911.]

(a) Reconnaissance Map of Southwestern Seward Peninsula, Alaska. 1:250,000 (1 in.=3.95 miles). (65°32'-64°20' N.; 164°0'-164°40' W.). Surveyed in 1900, 1903 and 1909. 2 colors. Pl. I. {Relief in brown contours, interval 200 ft.; drainage in blue; culture in black.}

(b) Geologic Map of Southeastern Seward Peninsula, Alaska. 1:250,000. 11 colors. Pl. VI. [Geology superimposed on map (a) as a base. Distinguishes between: A. Sedimentary rocks: I Non-metamorphic (2 subdivisions); II Metamorphic (2 subdivisions). B. Igneous rocks: I Non-metamorphic (3 subdivisions); II Metamorphic (1 subdivision).]

(c) Geologic Map of Nulato-Norton Bay Region, Alaska. 1:500,000 (1 in.=7.89 miles). (65°32' - 64°0' N.; 162° - 155½° W.) 12 colors. Pl. V. [Relief in sketch contours, interval 400 ft. Geological subdivisions as on map (b), except for non-metamorphic igneous rocks, which comprise 4 subdivisions.]

(d) Map Showing Distribution of Timber. [1:1,360,000 (1 in.=21½ miles approx.).] (65°30' - 64°8' N.; 164° - 157° W.). Black. Pl. IV. [Timbered areas shown in stippling.]

(e) Geologic Map of Omilak Region. [1 in.=2 miles (1:126,120).] (65°8' - 64°54' N.; 162°40' - 162°20' W.). Black. Pl. VII.

ARIZONA. Map of the Black Mesa Coal Field, Arizona. By M. R. Campbell. 1:500,000 (1 in.=7.89 miles). (36°42' - 36°30' N.; 111°25' - 109°32' W.). Black. With inset showing general location. Accompanies, as Pl. XI, *Bull.* 431, 1911.

ARIZONA. Map of the Pinedale Coal Field, Navajo Co., Arizona. By A. C. Veatch. [1:46,000 approx. (1 in.=0.7 mile approx.).] (About 34°18' N. and 110°25' W.). Black. With inset showing general location. Accompanies, as Pl. XII, *Bull.* 431, 1911.

MONTANA. (a) Map of the Northeastern Part of the Bull Mountain Coal Field, Montana. By C. T. Lupton and H. Hinds. 1:63,360. (1 in.=1 mile). (46°36' - 46°24' N.; 108°15' - 107°45' W.). Black. (b) Map of the Southeastern Part of the Bull Mountain Coal Field, Montana. By C. T. Lupton and H. Hinds. 1:63,360. (46°24' - 46°8' N.; 108°2' - 107°47' W.). Black. Accompany, as Pls. VI and VII, *Bull.* 431, 1911.

NORTH DAKOTA. Map of North Dakota Showing Location of Gas Wells. [1:2,600,000 approx. (1 in.=41 miles approx.).] (49° - 46° N.; 104° - 96½° W.). Black. Accompanies, as Pl. I, *Bull.* 431, 1911.

OREGON. (a) Map of the Coos Bay Coal Field, Oregon. By J. S. Diller and M. A. Pishel. [1:200,000 approx. (1 in.=3.2 miles approx.).] (43°26' - 43°2' N.; 124°27' - 124°7' W.). (b) Map of the Northern Part of the Coos Bay Coal Field, Oregon. By J. S. Diller and M. A. Pishel. 1:63,360 (1 in.=1 mile). (43°26' - 43°21' N.; 124°20' - 124°6' W.). Black. (c) Map of the Middle Part of the Coos Bay Coal Field, Oregon. By J. S. Diller and M. A. Pishel. 1:63,360 (43°21' - 43°16' N.; 124°24' - 124°6' W.). Black. (d) Map of T[ownship] 27 S., R[ange] 13 W., Coos Bay Coal Field, Oregon. By J. S. Diller and M. A. Pishel. 1:63,360 (43°16' - 43°11' N.; 124°18' - 124°10' W.). Black. Accompany, as Fig. 4 (p. 199) and Plates VIII, IX and X, *Bull.* 431, 1911.

OREGON-IDAHO. Reconnaissance Sketch Map of the Prospective Gas and Oil Fields near Vale, Ore., and Payette, Idaho. 1:250,000 (1 in.=3.95 miles). (44°20' - 43°45' N.; 117°30' - 116°50' W.). Black. With inset showing general location. Accompanies, as Pl. III, *Bull.* 431, 1911. [Township and range lines only. Distinguishes between basalt and rhyolite and Payette and Idaho formations. Gives locations of prospect oil wells, gas wells, of anticlinal and synclinal axes, of faults. Wagon roads shown. On inset map course of lower Salmon R. is taken from obsolete maps, although the U. S. G. S. standard base map gives it correctly.]

UTAH. Map of San Juan Oil Field, Utah. Based on map by E. E. Miller. 1:250,000 (1 in.=3.95 miles). (37°26' - 37°0' N.; 110°5' - 109°33' W.). Black. With inset showing general location. Accompanies, as Pl. II, *Bull.* 431, 1911. [No geographic coordinates; township and range lines only. Gives location of anticlines and of oil seeps. Shows areas within which drilling has been done. Wagon roads shown.]

VIRGINIA. Sketch Map of the Powell Mountain Coal Field, Virginia. [1 in.=2 miles (1:126,720).] (36°51' - 36°35' N.; 80°38' - 80°13' W.). Black. With inset showing general location. Accompanies, as Pl. V, *Bull.* 431, 1911. [Shows faults, coal mines and coal prospects.]

General

OREGON-WASHINGTON. Index [Map] to Atlas Sheets. Oregon, Washington. 1:2,500,000 (1 in.=39.46 miles). Extract from U. S. G. S. Base Map. Edition of May 1, 1911. On reverse, list of special maps and of geologic folios of Ore. and Wash., of maps of the U. S., and names and addresses of local agents for topographic maps. Accompanied by list of geologic reports relating to this region which are not parts of the topographic or geologic atlas. [Distinguishes between: (1) topographic field work completed; sheets in course of publication, (2) topographic sheets published, (3) topographic sheets and geologic folios published, (4) maps of same region on two scales.]

U. S. COAST AND GEODETIC SURVEY

Atlantic Coast

North Shore of Long Island Sound. Blackstone Rocks to South End, Including Brandford Harbor, Connecticut. 1:10,000 (1 in.=0.16 mile). (41°17.6' - 41°12.5' N.; 72°53' - 70°47' W.). Chart No. 261. May 1911. 50 cents. [Relief in contours; interval 20 ft.]

New Haven Harbor, Connecticut. 1:20,000 (1 in.=0.32 mile). (41°20.1' - 41°10.3' N.; 73°0' - 72°51' W.). Chart No. 362. May 1911. 20 cts. [Relief in contours; interval 20 ft.]

Jamaica Bay and Rockaway Inlet, Long Island, New York. 1:20,000. (40°39.4' - 40°31.8' N.; 73°57.0' - 73°44.2' W.). Chart No. 542. April 1911. 50 cts.

Philadelphia Water Front, Schuylkill River, Pennsylvania. 1:9,600 (1 in.=0.13 mile). (39°58.8' - 39°52.3' N.; 75°13.8' - 75°9.5' W.). Chart No. 381. April 1911. 50 cts.

Rappahannock River. Marsh Point to Fredericksburg. Chesapeake Bay, Virginia. 1:20,000. (38°15.9' - 38°7.4' N.; 77°19.2' - 77°5.2' W.). From Marsh Point to Mill Reach on main map; from Mill Reach to Fredericksburg (38°14.0' - 38°18.7' N.) on inset. Chart No. 536. May 1911. 50 cts.

Gulf Coast

Point au Fer to Marsh Island, Louisiana. 1:80,000 (1 in.=1.26 mile). (29°51' - 29°4' N.; 91°49' - 91°8' W.). Chart No. 199. May 1911. 50 cts.

San Luis Pass to Matagorda Bay. 1:80,000. (29°7' - 28°34' N.; 95°59' - 94°3' W.). Chart No. 1281. May 1911. 50 cts.

West Indies and Panama

Colon Harbor, Panama. 1:15,000 (1 in.=0.23 mile). (9°25.3' - 9°18.3' N.; 79°58.3' - 79°52.7' W.). Chart No. 950. May 1911. 50 cents.

Pacific Coast

Santa Rosa Island to Point Buchon, California. 1:200,000 (1 in.=3.16 miles). [Oriented N. 18° E.] (35°20' - 33°40' N.; 121°20' - 120°0' W.). Chart No. 5300. May 1911. 50 cts.

San Francisco, Southern Part, California. 1:50,000 (1 in.=0.79 mile). (37°49.0' - 37°24.5' N.; 123°24.5' - 121°57.0' W.). Chart No. 5531. May 1911. 50 cts. [Relief in contours; interval 20 ft.]

Mare Island Strait, California. 1:20,000. (38°7.6' - 38°2.9' N.; 122°17.4' - 122°13.6' W.). Chart No. 5525. May 1911. 20 cts.

Cape Flattery to Dixon Entrance, Northwest Coast of [North] America. [Mercator projection: equatorial scale 1:1,800,000 approx.] (54°50' - 47°35' N.; 138° - 123° W.). Chart No. 7002. May 1911. 50 cts.

Pacific Ocean—Philippine Islands

Anchorage, Verde Island Passage to Cuyo, Philippine Islands. [7 charts, viz.:] (1) Looe Bay, Lubang Island. 1:25,000 (1 in.=0.39 mile). (13°44' N.; 120°17' E.). (2) Sablayan Anchorage, West Coast of Mindoro. 1:10,000. (12°50' N.; 120°45' E.). (3) Paluan Bay, West Coast of Mindoro. 1:60,000 (1 in.=0.94 miles). (13°23'2' N.; 120°29' E.). (4) Cuyo Anchorage, Cuyos Islands. 1:150,000 (1 in.=2.36 miles). (10°51' N.; 121°0' E.). (5) Port Tilig,

North Coast of Lubang. 1:35,000 (1 in.=0.55 mile). (13°49' N.; 120°11' E.) (6) Port Culion, Culion Island. 1:30,000 (1 in.=0.47 mile). (11°54' N.; 120°1' E.) (7) Coron and Port Uson, South Coast of Busuanga. 1:40,000 (1 in.=0.63 mile). (12°2' N.; 120°13' E.) Chart No. 4345. May 1911. 30 cts.

Harbors in Negros and Vicinity, Philippine Islands. [9 charts, viz.:] (1) Dumaguette, Southeast Coast of Negros. 1:10,000. (9°18½' N.; 123°18½' E.) (2) Himugaan River, North Coast of Negros. 1:15,000. (10°57' N.; 123°24' E.) (3) Calagcalag Bay, East Coast of Negros. 1:10,000. (9°50' N.; 123°8½' E.) (4) Refugio Pass, East Coast of Negros. 1:35,000. (10°28' N.; 123°25' E.) (5) Bais, East Coast of Negros. 1:30,000. (9°36' N.; 123°9' E.) (6) Port Canaan, Siquijor Island. 1:5,000 (1 in.=0.08 mile). (9°15' N.; 123°35½' E.) (7) Port Bombonan, South Coast of Negros. 1:10,000. (9°3' N.; 123°7' E.) (8) Port Siyt, South Coast of Negros. 1:10,000. (9°4' N.; 123°9' E.) (9) Himamaylan, West Coast of Negros. 1:20,000. (10°5' N.; 123°52' E.) Chart No. 4466. May 1911. 30 cts.

HYDROGRAPHIC OFFICE

Pilot Chart of the North Atlantic Ocean. July 1911. [Mercator projection: equatorial scale 1:15,900,000 approx.] (60° N.-0°; 102° W.-10° E.) With two insets showing (a) distribution of average number of days with gales in July and (b) isotherms, isobars, and isogonic lines for July. 3 colors. On reverse: [Map of] The Gulf Stream in the Gulf of Mexico Showing the Currents as they Exist During the Different Seasons. By Lieut. J. C. Soley, U. S. N. [Mercator projection: equatorial scale 1:14,350,000 approx.] (30½° - 18° N.; 98° - 77° W.) Reprinted from Pilot Chart of North Atlantic Ocean of March 1909.

U. S. WEATHER BUREAU

Meteorological Chart of the North Atlantic Ocean. a. July, b. August 1911. [Mercator projection: equatorial scale 1:15,000,000 approx.] (60° N.-0°; 102° W.-10° E.) 5 colors. On reverse two maps, with notes, showing water surface temperatures, air temperatures and currents, for July, of (a) North Atlantic Ocean. [Mercator projection: equatorial scale, 1:37,500,000 approx.] (60° N.-0°; 100° W.-0°.) 1 color; (b) North Pacific Ocean. [Mercator projection: equatorial scale, 1:60,000,000 approx.] (70° N.-0°; 114° E.-76° W.) 1 color.

Meteorological Chart of the North Pacific Ocean. a. July, b. August 1911. [Mercator projection: equatorial scale, 1:30,000,000 approx.] (70° N.-0°; 114° E.-76° W.) 6 colors. On reverse, maps with notes as on Chart of North Atlantic Ocean.

Meteorological Chart of the Indian Ocean. a. July, b. August 1911. [Mercator projection: equatorial scale, 1:22,700,000 approx.] (30° N.-50° S.; 10° - 140° E.) 4 colors.

Meteorological Chart of the Great Lakes. a. July, b. August 1911. [Mercator projection: equatorial scale, 1:2,800,000 approx.] (49° - 41¼° N.; 92¼° - 76° W.) 6 colors. On reverse, table of wind velocities and lists of wireless telegraph stations and submarine signal-bell stations.

WAR DEPARTMENT

PORTO RICO. (a) Road and Railroad Map of Porto Rico, June 30, 1910. [1:575,000 approx. (1 in.=9 miles approx.)] Black. (b) Map [of Porto Rico] Showing Telegraph and Telephone Lines in Operation by Insular Government, June 30, 1910. [1:580,000 approx. (1 in.=9 miles approx.)] Black. Accompany, facing p. 124, Appendix III, Tenth Annual Report of the Governor of Porto Rico, in *Annual Report*, War Dept., 1910, Vol. IV, 1911.

BUREAU OF AMERICAN ETHNOLOGY

ARIZONA. Sketch Map of the Navaho National Monument from Official Reports by W. B. Douglass. U. S. Gen'l. Land Office. 1910. [1:345,000 approx. (1 in.=5 miles approx.)] (37°6' - 36°30' N.; 110°0' - 110°15' W.) Accompanies, as Pl. 22, "Preliminary Report on a Visit to the Navaho National Monument, Arizona," by J. W. Fewkes, *Bull.* 50, Bureau of Amer. Ethnol. 1911. [Shows location of pre-historic ruins of northern Arizona.]

UNITED STATES. Indian Tribes of the Lower Mississippi and Adjacent Gulf Coast by John R. Swanton. 1909. [1:3,500,000 approx. (1 in.=55 miles approx.).] (34 2/3° - 28 1/2° N.; 95° - 84° W.) 7 colors. Accompanies, as Pl. I, treatise with similar title by same author, *Bull.* 43, Bureau of Amer. Ethnol., 1911. [Distinguishes between following linguistic families: Caddoan, Siouan, Muskogean (a) proper, (b) of the Natchez group, Tunican, Chitimachan, Atakapan.]

NORTH AMERICA

CANADA. Map of Abitibi Region Indicating the Surveyed Townships Traversed by the Transcontinental and Those Projected Lying to the South of this Line of Railway. [1 in.=4 miles (1:253,440).] (51°40' - 47°20' N.; 79°45' - 76°45' W.) 1 color. Two sheets. Dept. of Lands and Forests, Quebec. Jan. 4, 1911. [Valuable large scale map of the region between Lake Temiscaming and James Bay. Relief not shown.]

CANADA. Vicinity of the National Transcontinental Railway. Abitibi District, Quebec. Map 12 A. Areal Geology, Exploratory, Quebec. 1:253,440, or 4 miles to 1 inch. (48°53' - 48°0' N.; 79°34' - 75°23' W.) 3 colors. With inset showing general location of main map. Accompanies, as No. 1112, Geol. Surv. of Canada, "Geological Reconnaissance Along the Line of the National Transcontinental Railway in Western Quebec," by W. J. Wilson, *Memoir* No. 4, Publ. No. 1110, Geol. Surv. of Canada, 1910. [Distinguishes between Keewatin, Laurentian and Drift. Indicates glacial striae.]

CANADA. (a) Outline [Map] of Part of Southern Ontario showing localities where the altitudes of the Algonquin and Nipissing shore lines have been measured; the height of the Algonquin shore line in feet above sea-level at each place; isobases, hinge-line and line of direction of maximum inclination of the Algonquin water plane. [1 in.=12 miles (1:760,320).] [Oriented N. 21° W.] (Includes Interlake Peninsula of Ontario W. of Pigeon Lake except southern part.) With "Profile of Warped Water Planes along Lines A-B, C-D [on map]," [horizontal scale 1:560,000 approx.; vertical exaggeration 500 times]. Black. (b) Diagram Showing Present Attitude of the Algonquin Water Plane (alternative title in text: General Map of the Great Lake Region Showing Isobases of the Algonquin Beach). [1:4,700,000 approx. (1 in.=74 miles approx.).] (46°40' - 41°50' N.; 89°0' - 78°15' W.) Black. (c) Diagram Showing Present Attitude of the Nipissing Water Plane (alternative title in text: General Map of the Great Lake Region Showing Isobases of the Nipissing Beach). Black. Accompany, as Figs. 1, 2 (profile), 3 and 4, "An Instrumental Survey of the Shorelines of the Extinct Lakes Algonquin and Nipissing in Southwestern Ontario" by J. W. Goldthwait, *Memoir* No. 10, Publ. No. 1137, Geol. Surv. of Canada, 1910. ['Isobases' referred to are lines of present equal deformation of the shore line of the glacial lakes Algonquin and Nipissing.]

CANADA. Outline Sketch of the Northern Part of Purcell Range, British Columbia, from Provincial Mining Maps. 1:1,000,000 (1 in.=15.78 miles). (51°33' - 49°50' N.; 118°20' - 115°20' W.) With inset, 1:10,000,000, showing location of main map. 1 color. Accompanies "Across the Purcell Range of British Columbia," by T. G. Longstaff, *Geogr. Journ.*, Vol. 37, pp. 589-600, 1911. [Shows route of Dr. Longstaff and of Mr. A. O. Wheeler from Howser Lake up Howser Creek, over Bugaboo Pass (7,160 ft.) and down Bugaboo R. to Columbia R.]

CANADA. (a) Carte Régionale No. 2 de la Province de Québec comprenant les Comtés de St. Maurice, Maskinonge, Berthier, Joliette, Montcalm, L'Assomption, Jacques-Cartier, Hochelaga, Laval, Terrebonne, Soulanges, Vaudreuil, Deux Montagnes, Argenteuil et Ottawa. Dressée par A. M. Taché. 1:253,440 (1 in.=4 miles). (46°55' - 45°10' N.; 76°10' - 72°30' W.) 3 colors. Dépt. des Terres et Forêts, Québec. Jan. 1911. (b) Carte Régionale No. 6 de la Province de Québec, comprenant les Comtés de Témiscouata, Kamouraska, L'Islet, Montmagny, Bellechasse, Lévis, et Partie de ceux de Beauce, Lotbinière et Mégantic. Dressée par A. M. Taché. [1 in.=4 miles (1:253,440).] [Oriented N. 22 1/2° E.] Embraces valley of St. Lawrence from Lotbinière to mouth of Saguenay and all

of Province of Quebec on right bank from Lake Megantic to Lake Temiscouata.) 3 colors. Dépt. des Terres et Forêts, Québec. Feb. 1908. [On both maps no relief. Subdivisions of counties shown.]

CANADA. La Vallée du Lac Saint-Jean. Echelle: 12 milles au pouce (1:760,320). (49°7' - 48°0' N.; 72°55' - 71°0' W.) 5 colors. Accompanies "Chicoutimi et Lac St.-Jean" by E. Rouillard, *Bull. de la Soc. de Géogr. de Québec*, Vol. 5, (1911), pp. 157-184. [Shows public roads and railroads and boat lines on Lake St. John. Parishes politically colored. No relief.]

MEXICO. Outline Map of Lower California. From the Bureau of American Republics. With Corrections and Additions by E. W. Nelson. [1:7,200,000 approx. (1 in.=114 miles approx.)] (33° - 22° N.; 117½° - 108° W.) Black. Accompanies, on p. 446, "A Land of Drought and Desert—Lower California" by E. W. Nelson, *Natl. Geogr. Mag.*, Vol. 22, pp. 443-474, 1911. [Wagon roads and author's route shown.]

MEXICO. The National Geographic Magazine Map of Mexico. Prepared by J. G. Bartholomew. G. H. Grosvenor, Editor. The Edinburgh Geographical Institute: John Bartholomew & Co. 1:5,000,000 (1 in.=78.91 miles). (31° - 15° N.; 117° - 86° W.) 5 colors. Supplement to *Natl. Geogr. Mag.*, Vol. 22, No. 5 (May 1911). [A hypsometric map showing in five shades of brown the areas lying between the contours of 0, 500, 2,000, 5,000 and 8,000 ft. and above 8,000 ft. Additional contours not brought out by tints, one each between 0 and 500 ft. and 500 and 2,000 ft., two between 2,000 and 5,000 ft., one between 5,000 and 8,000 ft. and one above 8,000 ft. A map, in compilation and execution, of the usual excellence of the products of the Edinburgh Geographical Institute.]

MEXICO. Croquis Anexo al Informe acerca de una Exploracion en el Estado de Yucatan. 1:934,340 (1 in.=14.75 miles). (22° - 19½° N.; 91° - 87° W.) Black. Accompanies, as Pl. 53, paper with similar title by J. Engerrand and F. Urbina, *Parerg. del Inst. Geol. de Mexico*, Vol. 3, pp. 371-424, 1910. [Outline map showing route of expedition.]

CENTRAL AMERICA

CENTRAL AMERICA. État actuel des voies ferrées dans l'Amérique centrale. 1:10,000,000 (1 in.=157.83 miles). (19° - 7° N.; 92½° - 78° W.) Black. Accompanies, as Fig. 1 on p. 263, "Les Voies de Communication dans l'Amérique Centrale" by M. de Périgny, *Ann. de Géogr.*, Vol. 20, pp. 260-262, 1911. [Shows existing railroads and some steamship routes.]

SOUTH AMERICA

BRAZIL. Republica dos Estados Unidos do Brazil. [1:20,000,000 (1 in.=315.66 miles).] Black. Accompanies, facing p. 330, paper on "Les Limites Actuelles du Brésil par Suite des Derniers Arbitrages et Traités" by de O. Lima, *Compte Rendu*, IXème Congr. Intern. de Géogr., Tome III, pp. 327-333, Geneva, 1911. [Outline only. Of value because of Portuguese nomenclature. Boundaries indicated according to latest treaties.]

CHILE-ARGENTINA. Das Andine Gebiet Patagoniens zwischen 40° und 44° S. Nach den Arbeiten der chilenischen und argentinischen Grenzkommissionen und eigenen Aufnahmen entworfen und gezeichnet von Prof. Dr. Paul Krüger. 1:500,000 (1 in.=7.89 miles). (40°2' - 44°20' N.; 72°10' - 70°46' W.) 7 colors. Accompanies "Die Patagonischen Anden zwischen dem 42. und 44. Grade südlicher Breite" by Dr. P. Krüger, *Pet. Mitt., Erghft.* No. 164, 1909. [Drainage and glaciers in blue; relief in brown shading; Dr. Krüger's route in red; roads in black. Shows the boundary between Argentina and Chile according to the arbitration of Nov. 20, 1902, as well as the continental divide. Green lines show the boundaries between the alpine region, characterized by heavy precipitation and by an evergreen virgin forest; the subandine transitional region, a district of medium precipitation and park-like vegetation; and the plateau-like elevated pampa with its scant precipitation, glacial till and xerophytic vegetation. An excellent map, both in content and in execution.]

PERU. Croquis de la Ciudad de Iquitos y sus Alrededores por Jorge M. Von Hassel. 1:16,660 (1 in.=0.26 mile). Black. 1911. [Built-up areas shown. Crude in execution.]

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THE PLEISTOCENE GLACIATION OF
NORTH AMERICA VIEWED IN THE LIGHT
OF OUR KNOWLEDGE OF EXISTING
CONTINENTAL GLACIERS*

BY

WILLIAM HERBERT HOBBS

Until near the middle of the last century, interest in the scientific study of glaciers can hardly be said to have existed. Attention was first attracted to the subject in 1840 and 1841 by the appearance of monographs written by Agassiz and Charpentier and dealing with the glaciers of the Alps. The interest aroused was even then less because of the glaciers themselves than for the reason that Agassiz on the basis of his studies founded a new and highly attractive theory of origin for the so-called "drift" of the Alpine foreland and Northern Europe.

The vast ice mantle which he thus pictured in imagination as at one time spread over Northern Europe was tens of thousands of times larger than any glacier which he had seen, and must obviously have presented but few points of resemblance to the puny glaciers of Switzerland, but it was none the less clothed throughout with identical attributes.

It is one of the interesting coincidences of science that almost at the moment when Agassiz was hypothecating the great Pleistocene ice sheet of Northern Europe, the greatest of existing continental

* An address delivered before the Indiana Academy of Science at its annual meeting in Terra Haute, May 12, 1911.

glaciers was being independently approached by no less than three great exploring expeditions sent out under American, French, and English auspices. Although Wilkes, Dumont d'Urville, and Ross, all arrived at the margins of the great Antarctic ice sheet, no one of them set foot upon it; and thus the conception of earlier continental glaciers took definite shape before any existing example had been studied. To-day, three-quarters of a century later, with the newly acquired data of the Nordenskiölds, Nansen, von Drygalski, Scott and especially of Peary and Shackleton before us, it becomes necessary to recast all the traditional notions concerning continental glaciers, modelled as these have been upon the Alpine glacier type.

Let us, then, start afresh and, with all the available light of the present, consider the known types of existing glaciers; for as Sir Charles Lyell has so well said, "The present is the key to the past."

In order that glaciers may develop it is necessary that snow should accumulate in quantity greater than that which anywhere falls within the limits of a single season. More snow must, therefore, be precipitated than can be melted, and a residue must in the average year be left over to be added to accumulations of succeeding seasons. Wherever this condition exists, small glaciers are certain to be formed; for, unless melted, the snow accumulates until by its weight lower layers are transformed into ice, which under the influence of gravity moves down into lower levels until melting puts a stop to further extension.

The source of the snow by which glaciers are nourished, is in all cases the moisture carried in the atmosphere; though, as we shall see, the changes which this moisture undergoes before it is delivered to the glacier are notably different in the case of continental glaciers from what they are in other types. All the remaining types owe their existence and continued nourishment to the presence of an upland area which, being in the path of moisture-laden surface winds, has forced these air currents to rise and deposit their moisture in the form of snow. In contrast to continental masses of ice such glaciers may all be included under the name *mountain glaciers*.

It is a little difficult for one who has not given attention to thermodynamics to understand why the mere rise of air currents should compel them to deposit their moisture, but this may be made clear by homely illustrations.

First of all, it may be stated that the capacity of air to absorb moisture increases with its rise of temperature, and is decreased correspondingly when fall of temperature occurs. The air of a room twenty feet square and ten feet in height at a temperature of 80°

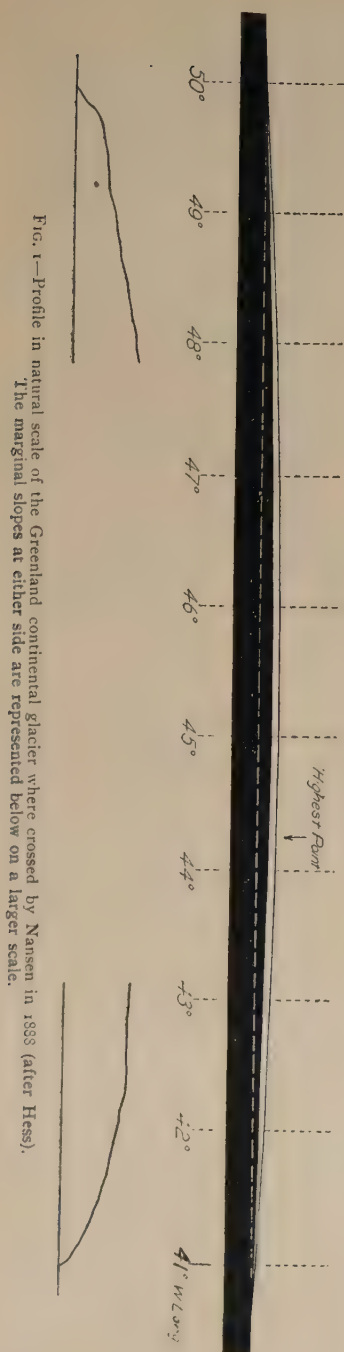


Fig. 1.—Profile in natural scale of the Greenland continental glacier where crossed by Nansen in 1888 (after Hess). The marginal slopes at either side are represented below on a larger scale.

Fahrenheit, can absorb $6\frac{1}{4}$ pounds of water in the form of vapor and is then said to be saturated. If now the temperature is reduced to 60° , the same volume of air can hold but $3\frac{1}{4}$ pounds of vapor, and three pounds, or nearly one-half, will be deposited as water. Cooling of the air has, therefore, the effect of precipitating moisture, and it is because air cools as it rises that rain or snow is precipitated upon mountain slopes.

The cooling of the air as it rises upon the slopes of a mountain range is largely the result of expansion as the air adjusts itself to the lower pressures of the higher air layers. This so-called *adiabatic* change of air temperature without heat being either communicated to or abstracted from it, may be illustrated by the air current which escapes from the opened valve of a bicycle tire that has been standing in the sun on a hot summer day. Although the tube and its contained air are so warm as to feel uncomfortable in the hand, the current of escaping air is none the less so refrigerated by its expansion as to feel distinctly cool. To repeat, then, mountain glaciers are all in common nourished by snow whose precipitation is brought about by adiabatic cooling of surface winds.

Glaciers are extremely sensitive to climate changes, and are extended by any lowering of the average annual temperature of the air, as they are reduced in size by any elevation of the seasonal temperatures. It has been estimated that a fall of but 3° Fahr. in the average annual temperature

within the Scottish Highlands, would cause small glaciers to develop there, and a very moderate fall only of the annual air temperatures within the lake region of North America would with little doubt bring about a re-invasion by an ice sheet such as has more than once covered it in the past. The nourishment of this ice sheet would, however, as we now know, be quite different from that of mountain glaciers.

Before we can discuss intelligently the conditions of nourishment and waste of continental glaciers, we must learn something of their form and the meteorological conditions which surround them. Fortunately, the studies of Baron Nordenskiöld, of Nansen, Chamberlin, von Drygalski and Peary upon the "Great Ice" of Greenland, and Otto Nordenskiöld, von Drygalski, David, Scott and Shackleton in Antarctica, have now supplied the necessary data for such a discussion.

As soon as we consider the physiographic development of a continental glacier, we note at the very outset that this is fundamentally different from that of any mountain glacier. Whereas in the latter the land surface always projects above the highest levels of the ice and snow, this is never true of a continental glacier. For this reason the mountain glacier is constrained to assume a form dependent upon the slope of the underlying rock within the hollows and troughs which it occupies upon the mountain surface. The continental glacier, on the other hand, blankets the entire rock surface except where the ice thins about its margins. Its model is, therefore, independent of its basement, and experience has shown that the form which it assumes is that of a flat dome or shield, as was first proven by Nansen in 1888 by his crossing of Southern Greenland (Fig. 1).

The continental glaciers of both Greenland and Antarctica are so vast and attain such elevations that mighty mountains may exist buried deep beneath the blanketing ice, and the crucial condition for the development of the domed surface is that all hollows and troughs of the basement shall be more than filled with snow-ice mass. If the scale be so reduced that we have to do with a small but high plateau surface on which the indentations are but slight, the same shield-like form is developed, as may be observed in the ice caps of Iceland and Southwestern Norway (Fig. 2). Whenever it is held within hollows of the underlying rock surface, the glacier has movements dependent upon that surface and is modelled upon it. Beneath a continental glacier, the rock surface may be either in the form of a dome or a basin, or, so far as we

know, may have a much more complex physiography. We know, at least, that the glacier of Northern Europe in late Pleistocene times rested upon the Baltic depression, behind the great rampart of the Norwegian plateau. The movements of continental glaciers are thus, unlike those of mountain glaciers, not determined by the grades of the underlying floor, and we must seek their cause in a different quarter.

The clue to the discovery of the manner of shaping of continental glaciers was furnished by Lieutenant, now Admiral, Peary, when in 1892 and again in 1893-5 he carried out his remarkable sledge journeys across Northwestern Greenland. Here, as he has expressed it, there was found "an imperial highway" across the desert of snow. Whenever his course lay relatively near to the margin of the ice, he was forced to descend into dimples of the surface which lay back from the outlets of the ice to the fjords indenting the margins. From these "basins of exudation" he would

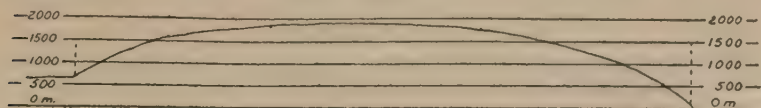


FIG. 2—Shield-like profile of an ice-cap in Iceland.

ascend the low ridge which lay between each dimple and its neighbors. Farther back from the ice margins these pronounced surface features faded gradually into a featureless plain of snow rising on imperceptible grades toward the interior of the continent.

Upon this desert of snow and sky Peary made a discovery of the greatest importance to students of glaciology. Whereas away from the continental ice, wind directions are determined directly by air pressures registered on the barometer, it was found that above the "Great Ice" the barometer readings were no longer of importance, for the wind direction was in all cases directly down the slope of the snow-ice surface. Upon the crests of the ridges which separated the dimples, calms were encountered, whereas within the basins the wind rushed down to the fjords from the ice plateau above. The directions of these currents were the same as those which would be set up within a film of water sliding off in all directions from the central area of the dome. Usually of sufficient strength to lift the dry granules of snow a couple of feet or more into the air, Peary advanced in a sibilant drifting snow cloud in which the dogs would be submerged perhaps for days.

When the wind developed greater strength, the drifting snow would rise to the height of a man, and during the characteristic blizzards it is probably carried to heights of 100 feet or more above the ice surface. Yet the direction of movement is always and invariably outward from the center of the dome.

The void which would otherwise develop above the center of the snow-ice shield, must be supplied from the upper air currents, which in consequence are drawn down in a central column—the eye of a so-called anticyclone fixed at this locality. Into this vortex come the high level clouds from lower latitudes—the antitrades—and from this continental ice mass are distributed the surface winds in a centrifugal arrangement. It must be evident, then, that surface air currents such as those whose moisture feeds the mountain glaciers, must be powerless to nourish continental ice masses.

The centrifugal air currents above the ice surface are explained by a refrigeration of the air layer which is in direct contact with the snow-ice surface. As all are aware, effective abstraction of heat from a gas, must be carried out at the top in order that the parts rendered heavier by cooling may descend and through diffusion affect the temperature of the remaining portions of the medium.

The movements of the cooled lower layers of air in contact with the ice are a direct consequence of the dome-like form of the mass, since this permits the heavier refrigerated bottom air to respond to the pull of gravity as do all bodies lying upon an inclined plane. Like them, also, the velocity is accelerated with time, so that blizzards which surpass in intensity any that are elsewhere known, develop periodically above our existing continental glaciers.

We have learned that when air is forced to ascend, it is cooled adiabatically; that is, without any abstraction of heat from it. Descending air currents, for a like reason, are correspondingly warmed as a result of their compression. Reverting to our example of the bicycle tire, every modern schoolboy is aware that the air which with the aid of a pump he forces into the tire becomes so warmed as to communicate its heat to the rubber of the tire. The air which slides down the slopes of the Greenland continental glacier is not infrequently so elevated in temperature as to make the hot and dry winds known as föhns a characteristic of the fjords on the margin of the continent.

But we have still to explain the derivation of such vast quantities of snow as must have been required to produce the continental

glaciers, where surface currents are effective only in transferring the snow from the central portions toward the periphery. This process must reduce the thickness of the glacier at the same time that it extends its margin (Fig. 3).

It is, moreover, at the margin of the continental glacier that the processes of waste become effective. Snow is here borne by the winds out upon the sea to be melted, icebergs are here detached and ultimately dissolved, and surface melting during the summer seasons may reduce the level of the ice surface. The most obvious effect of the anticyclone above the glacier is, therefore, to waste, rather than to nourish it. It is not here in point to affirm that existing continental glaciers are to-day in process of gradual extinction, since they appear to be drawing in their margins; for it is

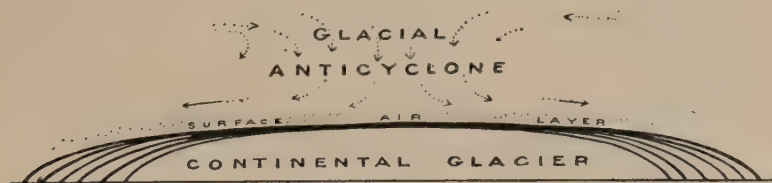


FIG. 3.—Diagram to show the position of the glacial anticyclone above a continental glacier, and the manner in which the latter is shaped by its action.

none the less clear that they must in an earlier stage have acquired their vast proportions beneath the same fixed anticyclone of the atmosphere.

Is there, then, within the upper atmosphere a content of moisture which can by any process be deposited upon the glacier as snow in presence of the anticyclone? The carriers of moisture in the atmosphere are, as we well know, the clouds, and these in different levels assume quite different aspects. The highest, and the only ones characteristic of the sky above the continental glaciers of Greenland and Antarctica, are what are known as cirrus clouds or simply the cirri. The cirri usually float at elevations of between five and seven miles, and unlike the fleecy wool-pack clouds of lower levels, the cumuli, the cirri are detached, delicate, fibrous, and often feathery. In view of their great height, their moisture must be in the form of ice, both because of the existing temperature at that altitude (-65° F.), and because of the great adiabatic refrigeration to which vapor must have been subjected during its ascent from the ocean's surface.

We are not, however, dependent upon assumptions of this kind,

for cirri have more than once been penetrated by men in balloons. In the year 1850 Barral and Bixio ascending from Paris* encountered at an elevation of between four and five miles a cloud which consisted of fine ice particles. "We are enveloped," they say in their journal, "in little particles of ice in extremely fine needles which accumulate in the folds of our garments."

Effective scientific attack upon the problems of the upper atmosphere, is, however, all comprised within the last quarter of a cen-

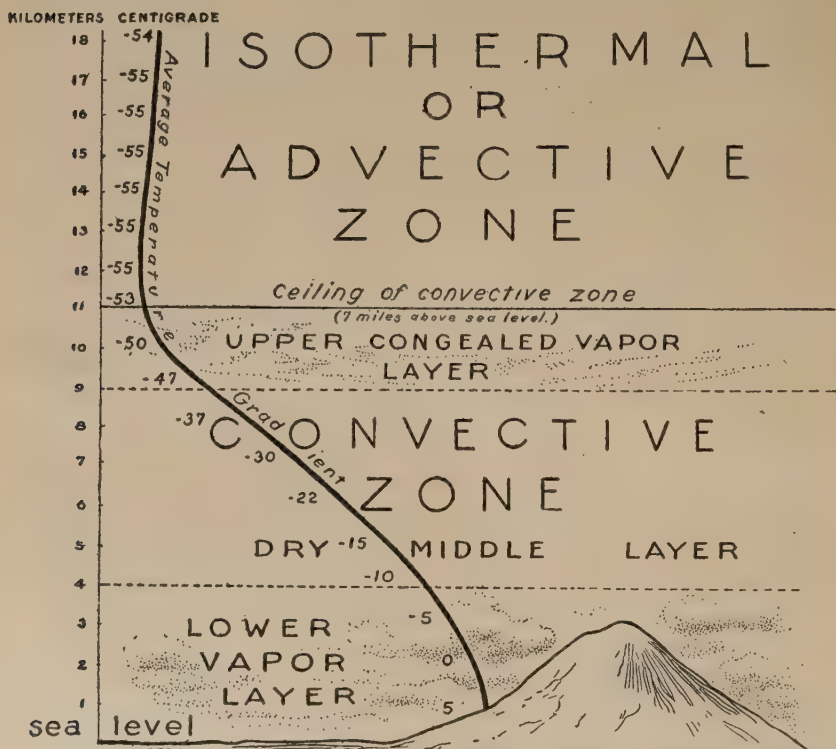


FIG. 4—Diagram to show the different layers of the lower atmosphere as determined by international observations with the use of both manned and sounding balloons.

tury, and has been coincident with so many other forward strides in science, that the results have received less attention than their importance demands. Manned balloons fitted with perfected meteorological instruments have repeatedly ascended to very high altitudes; Berson in the "Phoenix" to over six miles above the surface. On Dec. 4, 1894, when this ascent was made from Berlin,

* Barral et Bixio, Journal du voyage aéronautique fait le 27 juillet, 1850, *Comptes Rendus de l'Acad. Franc.*, vol. 31, 1850, p. 129.

at an elevation of nearly six miles, this daring balloonist penetrated a cirrus cloud which in the upper layers consisted of ice needles and in the lower of very fine ice crystals, and these latter appeared to be evaporating into the dryer air below.*

By means of sounding balloons which carry self-registering meteorological instruments, direct observations upon the atmosphere have now been carried to elevations of about 60,000 feet, or nearly 12 miles.†

As a result of extended studies undertaken with international coöperation, we now know that it is a relatively thin layer of the earth's atmosphere which is directly modified by the convective air currents arising at the surface (Fig. 4). This lower and so-called convective zone of the atmosphere at an altitude of nearly seven

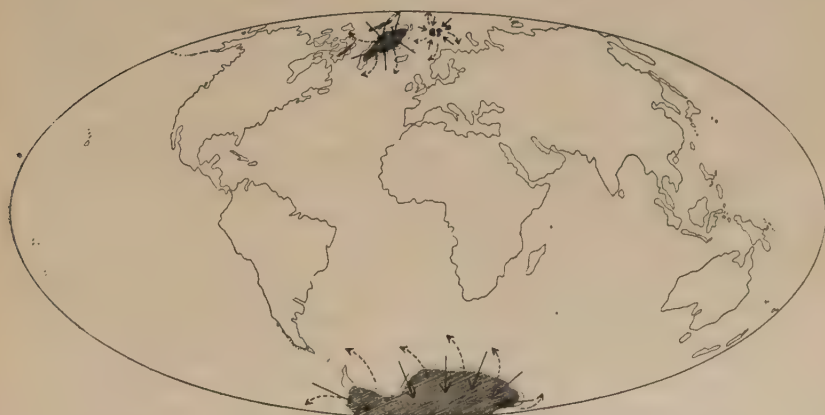


FIG. 5.—Map to show the positions of the existing continental glaciers, which develop the excentric wind poles above the earth's surface.

miles ends abruptly beneath the so-called advective or isothermal zone which is warmed solely by absorption from the sun's rays which penetrate it.

As we ascend in the convective zone from the earth's surface, we first pass through a more or less saturated layer in which float the lower clouds. This surface zone of saturation extends to an altitude of about two miles and is succeeded by a notably dryer layer devoid of clouds. The air temperatures, which have been

* R. Assmann, A. Berson, and H. Gross, *Wissenschaftliche Luftfahrten ausgeführt vom deutschen Verein zur Förderung der Luftschiffahrt in Berlin, 1899-1900*, vol. 2, p. 434, and vol. 3, p. 181.

† E. Gold and W. A. Harwood, *The present state of our knowledge of the upper atmosphere as obtained by the use of kites, balloons, and pilot balloons* (Report of Committee read at the Winnipeg meeting of the British Association for the Advancement of Science in 1909), Rept. Brit. Ass., 1909, pp. 1-55.

falling rapidly as we ascend from the surface, are from here lowered by a nearly uniform and even more rapid rate approaching the adiabatic gradient for dry air. Nearing the top of the convective zone, where the temperature descends to some 67° below the zero of our Fahrenheit scale, moisture is again encountered, but here only in the congealed condition made visible at the earth's surface as the cirri. These cirrus clouds move with quite extraordinary velocity beneath the isothermal zone of the atmosphere, and in this may be compared to the water vapor, which rising in a room floats laterally just below the ceiling. Above this convective ceiling of the atmosphere, the air is dry, of almost uniform temperature, and with winds of much lower velocities than in the layer below.

As already stated, the cirri are the characteristic and almost the only clouds which have been observed above the Greenland and Antarctic continental glaciers. At times these clouds are distributed in long bands known as "polar bands" or "Noah's Ark" clouds, which, starting from a point upon the horizon, after passing the zenith converge at an opposite point. In the light of present known facts the high-level antitrades of moderate or low latitudes travel poleward with their moisture in the form of ice needles, and this is returned to the earth's surface in the vortices of great anti-cyclones fixed above the existing continental glaciers. These high latitude glaciers are thus, so to speak, excentric wind poles of the earth quite analogous to the excentric magnetic poles (Fig. 5).

In order to comprehend the manner of this return, we must first familiarize ourselves with the existing atmospheric condition above and about the great continent of Antarctica. If in the more open summer season we sail into high southern latitudes, we there encounter drifting sea ice, which is slowly moving northward into lower latitudes. An all but impenetrable wall, this pack ice hems in the Antarctic, and has in large measure been responsible for the tardiness of our attack upon the fascinating problems of that inhospitable region. Wherever low islands are encountered upon our course, they are found buried beneath a dome of snow and ice, while higher islands reveal projecting shoulders only of rock each bordered by a fringe of glacier, the well-known ice-foot of the southern seas.

Approaching the margins of the continent, it is not generally land that is seen, but a perpendicular wall of compacted snow which looms up in the distance, and can be followed by the eye into the distant horizon. Arriving at this escarpment, further navigation is stopped, and the problem is now to discover a favorable locality for scaling

the cliff. This so-called barrier or shelf-ice constitutes an inner and vastly thicker floating fringe of ice, which may be regarded as the second line of defense which in Antarctica has been raised against invasion by explorers. Though the problems of this shelf-ice are of great interest, they are not within the scope of the present paper.

Passing, then, this second ice terrace, which upon the Ross Sea has a width of more than three hundred miles, we at last arrive at the true continental glacier resting upon the land and resembling that which we have come to know in Greenland.

At one place only, so far as yet known, does this inland ice come down directly to the sea without an intervening rim of shelf-ice. This locality is in Kaiser Wilhelm II Land, near where the German Antarctic Expedition wintered. Here the flat dome of blue ice may be seen rising and fading away into the dim distance. The sweeping contours of the ice shield are even better revealed in views from the lone volcanic peak, the Gaussberg, somewhat within the glacier margin and the one sombre patch in the surrounding ice-scape.

Wherever held in by a wall of mountains, as in Victoria Land, the ice margin has, in the only places where its sections may be observed—the infrequent portals in the mountain rampart—a slope which is steep and rugged in the extreme. Shackleton's plucky ascent up the Beardmore portal after first crossing the 300 odd miles

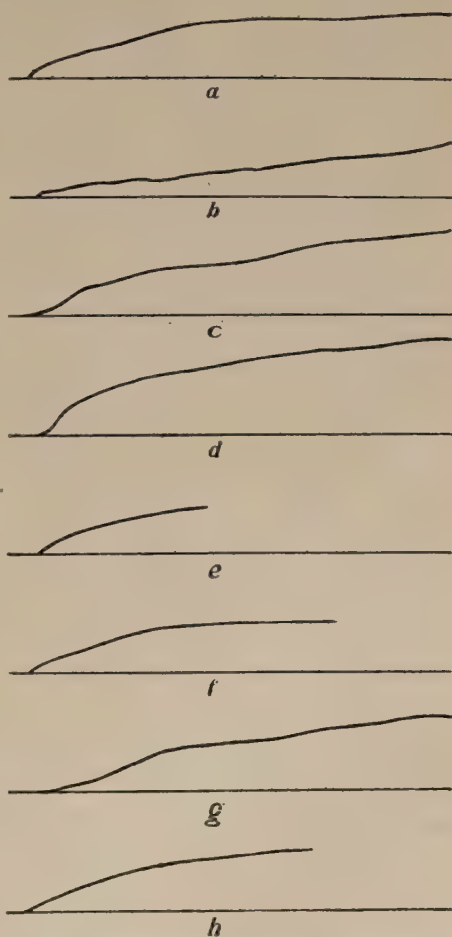


FIG. 6—Profiles across the margins of the continental glaciers of Greenland and Antarctica.

of barrier surface, is too fresh in mind to need repetition. After passing the mountains the slopes became more gradual, until at last his party advanced upon a surface so flat that to the eye it appeared horizontal, though constantly ascending toward the interior in a southwesterly direction. Scott and David have supplied us with sections across the ice margin in other parts of Victoria Land, and in these, as well as those already described from Greenland, we encounter but a single type of curve (Fig. 6). We are thus justified in saying that the flat dome of the Greenland continental glacier is duplicated in Antarctica.

But what has been learned of the air circulation above the continental glacier of Antarctica? As long ago as 1840, when Sir James Ross first sailed southward down the sea which bears his name to the front of the Great Ross Barrier, he recorded constantly increasing air pressures as though he were advancing toward a fixed anticyclone. More than a half century later, when the new era of Antarctic exploration had been initiated by the "Belgica" expedition, even though no one had yet set foot upon the continent, Bernacchi observed the prevailing southeasterly winds about its margin and was able to write of them:

"Their frequency and force, the persistency with which they blow from the same direction, the invariable high rise in the temperature, their dryness, the motion of the upper clouds from the NW., and, finally, the gradual rise in the mean height of the barometer to the south of about latitude 73° S., seem to indicate that the Antarctic lands are covered by what may be regarded practically as a great permanent anticyclone, with a higher pressure than prevails over the open ocean to the northward."

The Shackleton expedition has now removed any doubt which could before have existed upon the subject. Travelling southward upon the ice plateau, Shackleton found that the winds were always in his face, and that the snow dunes, the so-called *sastrugi*, indicated that this was the constant wind direction. The data from the journey of David to the south magnetic pole, though more complex because nearer the ice margin, are yet in some respects even more complete and convincing, while Scott's earlier expedition westward from McMurdo Sound may be drawn upon for still further confirmation. In the sky above the ice dome, high level cirrus clouds were often seen floating away towards the high interior, or in a direction almost exactly opposed to that of the surface air currents.

Just as in Greenland, so here, the dry granular snow upon the glacier surface is being constantly lifted by the wind and carried outward to the margins. The gigantic centrifugal broom moves

rhythmically above Antarctica, the fierce blizzards corresponding to its outward strokes. At other times light sweepings of snow are borne outward along the surface, and Shackleton's decision to employ ponies rather than dogs in his expedition, was to insure that at ordinary times his draught animals might keep their heads above the drifting snow. Attaining the plateau, Shackleton travelled southward over a deposit of loose snow which the terrific blizzard encountered near his farthest south swept entirely away and left for his return a hard and white snow surface resembling Carrara marble. Returning by the Beardmore outlet, the upper one hundred miles he found likewise cleared of snow, while the lower forty miles lay buried deep beneath the sweepings.

The observations made at the British winter station at the margin of the Ross Barrier, have in addition supplied us with a degree of detail concerning the action of this Antarctic refrigerating engine which rhythmically develops and in turn terminates the southern blizzard. The completeness of our evidence is in large measure explained by the presence of the active volcano of Erebus, the movements of whose steam cap give some hint of the direction of the higher air currents for comparison with the lower. The conditions at this station during an Antarctic blizzard were found to follow one another in regular and orderly sequence. The series begins with a gentle northerly wind, which continues for a day or two and is believed to represent air drawn inward by the contraction of the air layer in contact with the ice during a calm above the plateau. To this faint breeze there now succeeds an absolute calm which continues for two or three days. A week or more from the beginning of the calm, the air begins to move outward from the continent, due to its sliding motion down the plateau slopes, and soon develops the force of a blizzard. Simultaneously with this movement, the steam cloud above the crater of the volcano, which normally indicates an upper current from the northwest, swings around to the north and takes on an accelerated movement, as though the upper air were suddenly drawn toward the center of the plateau to fill the void there forming.

Although the winter station was located in a valley and generally controlled by local winds from the southeast, as soon as the blizzard had developed full force, this local tendency was overmastered and the wind came from the southwest off the plateau, but local conditions were resumed with the waning of the tempest. With the air always clear and dry, the blizzard comes to an end in a sudden warming of the air, the inevitable effect of its descent from the

plateau. A rise of temperature of as much as 45° Fahr. has been observed to occur within twenty-four hours, and simultaneous with this elevation of the temperature a fresh snow is precipitated which is in contrast with that picked up and driven by the wind in the previous stages.

With so many of the data at hand, we may now discuss with some confidence the mechanics of the process—the operation of the refrigerating air engine of the Antarctic. The air descending in the vortex of the anticyclone to replace that which has slipped outward and downward upon the ice dome, is heated by its fall so that the ice needles of the cirri are first melted and then vaporized. Both these changes abstract heat from the air column and thus retard the temperature elevation due to descent. When, however, the air has been heated sufficiently, the movement within the vortex is reversed, so that a current begins to ascend in the chimney of the anticyclone. As a consequence, the upper currents now move outward instead of inward, and no doubt for this reason the steam cloud over Erebus is likewise temporarily reversed in direction, indicating a current from the south. It is in this manner, then, that the blizzard brings about its own extinction.

The snow which is precipitated at the close of the blizzard is apparently the result of the moisture derived from the melting and vaporization of the ice needles of the cirri reaching the plateau and being suddenly chilled either by contact with the ice or by admixture with surface layers of cooler air. It is characteristic of such fresh snows over continental glaciers that the sky is not clouded and that the sun may be seen through the midst of fine snow needles. Baron Nordenskiöld has described a quite remarkable fall above the inland ice of North East Land, where partially melted ice grains enveloped in a globule of water were precipitated together with soft snow in an air temperature a number of degrees below the freezing point.

The transfer of such vast quantities of rounded snow grains from the interior to the margins of continental glaciers, furnishes another striking parallel to the deserts of lower latitudes. Here it is the sand which is lifted by the wind and borne to the margins. A comparison of the marginal profiles of our continental glaciers with those taken on the lee of great sand dunes is, therefore, not without interest, and for the Antarctic at least we are able to say that the shaping of the glacial margins is in large measure accomplished by the surface winds of the anticyclone.

The snow which falls at the end of the blizzard—while the engine

is slowing down or reaching the end of its stroke—may be, as we have seen, picked up in the early stages of the next succeeding blizzard and transferred to the margins. At other and more favorable times, it would appear that it is retained upon the surface, for sections carried a short distance below the surface show an alternation of snow deposits which may well represent the growths of successive seasons, and it is necessary to assume that the glacier acquired its vast proportions beneath the same fixed anticyclone which we study to-day.

The above in merest outline appears to be the process by which the continental glaciers are both nourished and shaped, a process which has little in common with that which feeds the infinitely smaller mountain glaciers. It is the lowest saturated layer of the convective zone of the atmosphere whose moisture feeds the mountain glacier. It is by contrast the uppermost layer of the same zone whose congealed moisture is drawn down to supply the nourishment of continental glaciers. Inadequate as is this outline, it is all that can be introduced in this paper, and those who find it unsatisfactory may be referred to a fuller treatment in technical papers* and in a book upon the "Characteristics of Existing Glaciers."†

FIG. 7.—Line setting forth the approximate proportions of expanse to thickness between the center and the margin of the latest continental glacier above the continent of North America.

Living, as so many of us do, within the glaciated region of North America, we are naturally interested in the application of these observations to the great glaciers of Pleistocene times. Heretofore pictured in imagination as enlarged models of Alpine glaciers, these vast mantles of ice were conceived to have spread over the country by a kind of viscous flow similar to that of the proverbial molasses in January. There are, however, some noteworthy differences, as we can now appreciate. The maximum thickness of the latest Pleistocene glacier was assumed to have been 10,000 feet near the summit of its dome in Central Labrador, though it may perhaps have been twice that thickness. From this point the ice travelled southward up the northern slope of the Laurentian divide in Canada and thence to the Ohio River, a distance of over 1,300 miles. If such a mantle of ice be represented in its natural propor-

* Characteristics of the inland-ice of the Arctic region. *Proc. Am. Phil. Soc.*, vol. 49, 1909, pp. 96-119; The ice masses on and about the Antarctic continent. *Zeit. f. Glaciologie*, vol. 5, 1909, pp. 107-120.

† The Macmillan Co., New York, May, 1911.

tions from the center to the margin, we may use a line six inches in length and $1/100$ of an inch in thickness to represent a thickness of 10,000 feet (Fig. 7). Obviously, the force of gravity acting within the ice would be incompetent to effect a transfer from the center to the periphery, yet until the fixed glacial anticyclone had been proven and its efficiency as a broom recognized, no other hypothesis than that of viscous flow had been offered in explanation. For the Pleistocene period the fixed anticyclones were vastly larger than those of the present, and the wind circulation of the globe must have been a notably different one (Fig. 8).

But, it is urged, we have in the polished and striated rock pavement beneath the drift, the clearest evidence that the lowest layers of the Pleistocene glacier were shod with boulders, that these abraded



FIG. 8—Map to show the position of the continental glaciers of Pleistocene time, and the wind poles of the earth for the same period.

the underlying rock surface, and that there was a radial movement from the Labrador and Keewatin centers of dispersion. These facts cannot be gainsaid, but what we sometimes forget is that each expansion of the ice was followed by a retreat from the invested region, and, further, that the steep gradients of the surface upon continental glaciers are restricted to the outer fifty or one hundred miles. Within this marginal zone, and here only, are surface slopes sufficiently steep to give rise to true viscous flow or whatever may be the manner of adjustment within the ice under the influence of gravitation. The abraded rock pavements may all be explained by grinding and plucking action under this outer zone, which during successive advances and retreats occupies in turn all portions of the area.

The direct observation of ice movement in existing glaciers is of necessity restricted to surface and near surface layers and is of two distinct types. On the one hand there are inferences made from surface contours, from crevasses, etc., and on the other there are direct measurements carried out during more or less protracted periods. Both in Greenland and in Antarctica we find the evidence of marked differences of velocity in the surface ice currents. Walled in by mountain ramparts, each great glacier indicates clearly an abnormally high velocity within and near the outlets. Above each portal of the enclosing mountain range, the ice surface is depressed in a distinct dimple, just as is a lake surface above a raceway. Such dimples of the glacier surface have been described as "basins of exudation" by Admiral Peary. Fissures or crevasses within the ice surface, the universally recognized marks of ice movement, are always most numerous and important near the glacial margin, but they fade out and disappear at only moderate distances within the border.

Upon the glacier outlets of Greenland rates of flow as high as fifty or even one hundred feet per day have been measured. Upon the Upernavik outlet von Drygalski measured a rate of flow of 59 feet per day, while upon the inland ice some distance back, but still comparatively near to the margin, the rate was less than one inch per day.

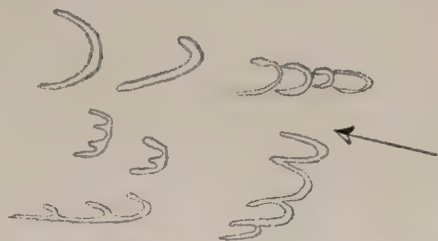


FIG. 9.—Map to show the orientation and distribution of sand dunes formed by winds of Pleistocene time. The prevailing winds instead of coming from the west, as at present, were from an easterly quarter (after Solger).

The one existing ice margin which must most resemble that of the Pleistocene glacier of North America was studied by the late German expedition to Antarctica. In the newly discovered Kaiser Wilhelm Land the ice spreads, it would appear, upon relatively flat slopes without constraint from a mountain rampart, and in consequence its slopes are apparently much flatter than those observed in other localities. Here the ice is reported to rise at its margin in a cliff from 130 to 165 feet in height, then on a steeply curving slope to an elevation of perhaps 1,000 feet, at which altitude the gradients have become relatively flat and with ever increasing flatness they extend into the far interior. Near the margin numerous fissures betray motion in the ice which exact measurements indicate to be only about one foot per day. At a distance of a mile and a

quarter back from the edge even this slight movement has diminished by fully one-eighth of its value.

Overtured icebergs which have been derived from this margin make it clear that the ice is here shod with boulders and is apparently performing the same kind of abrasional work that we find such ample evidence for within the glaciated region of North America. We must, therefore, it is believed, so modify our views of Pleistocene glaciation as to account for the shaping of the glacier by the action of the anticyclone, and for the abrasional work upon its floor by internal movements which are restricted to a relatively narrow marginal zone.

We are not to-day compelled to base all our knowledge of the Pleistocene continental glaciers upon analogies from existing ones. Direct evidence of a Pleistocene anticyclone has been obtained by Professor Solger of Berlin, who in studying the fossil sand dunes of the North German plain has shown that the prevailing winds at the time they were formed came not from the west, as they do to-day, but on the contrary, from the easterly quarter (Fig. 9).*

The contributions made to our knowledge of glaciers during the last quarter century, but especially during the last decade, have been truly remarkable, but instead of exhausting this field of research, they have merely blazed the lines along which inquiry must proceed. From actual observations we as yet know nothing concerning the higher air layers above a continental glacier. What a virgin field awaits that student of the free atmosphere who is prepared to experiment with kites and with both manned and sounding balloons above either of the existing continental glaciers! Though he will certainly encounter difficulties, these would appear to be by no means insurmountable. The exploits of Peary, Scott and Shackleton have so far stimulated polar expeditions that no less than six will this year winter in the Antarctic. The Norwegian, English and Australian parties under Amundsen, Scott and Mawson are already upon the ice, and Dr. Bruce, Lieut. Filchner and Lieut. Shirase will each direct expeditions under Scottish, German and Japanese auspices respectively. Though in most of these undertakings the lure of the pole is uppermost, yet scientific and geographic studies are not to be neglected. As regards the opposite pole of the planet, Donald

* F. Solger, Ueber fossile Dünenformen im norddeutschen Flachlande, *Verh. des XV deutsch. Geographentages zu Dantzig* (Riemer, Berlin), 1905, pp. 159-172, Pls. 4-5.

MacMillan, a companion of Peary on his latest expedition, is next year to head a scientific expedition upon the Greenland ice. Students of glaciology will watch with lively interest the developments in connection with all these expeditions, and let us hope that as a result our knowledge of continental ice masses will be greatly extended.

ANN ARBOR, Mich., May 9, 1911.

PROGRESSIVE DEVELOPMENT OF RESOURCES IN THE LAKE SUPERIOR REGION*

BY

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KEWEENAW PENINSULA CANALS AND THE COPPER MINES. The Portage Lake ship canals (Fig. 1), built where the great transverse valley nearly bisects Keweenaw Peninsula also show a large traffic and a steady increase with the development of the mineral resources of the region, especially the copper.

YEAR.	BOUND UP. NET TONS.	BOUND DOWN. NET TONS.	TOTAL FREIGHT. NET TONS.	VALUA- TION.
1895.....	560,672	363,084	923,756	\$29,832,368
1900.....	1,190,527	677,245	1,867,772	57,380,129
1905.....	1,528,937	933,973	2,462,910	79,998,109
1907.....	1,728,673	767,663	2,496,336	101,919,661

The copper (presumed to be chiefly not ore but the refined product) makes up only three-tenths of one per cent. of the tonnage shipped in 1907 (85,279 tons), though its value (\$39,228,340 in 1907) was over 38 per cent. of the tonnage. Other goods valued at \$101,919,661 were carried through the Portage Lake canals in 1907.

DECREASE OF LUMBER SHIPMENTS. Another product which is carried over the Great Lakes, is lumber; but in lumber transportation Lakes Superior and Huron and Michigan will doubtless never be as important as they have been in the past. The lumber shipped past Sault Ste. Marie decreased 300 million feet: 156 million feet.

* Continued from p. 572 in BULLETIN No. 8, August, 1911.

the Great Lakes trade route are not on the lake shore, however, and it is accordingly necessary to connect the mines with the nearest harbors by railways. That it has been possible to do this cheaply, and to operate the railroads at moderate expense, is due to the fact that mines, without a single exception, are situated at moderate distances back from the lake shore (Fig. 1), 50 and 80 miles in the case of mines of the Menominee and Crystal Falls districts, whose port is Escanaba; 11 to 14 miles in the case of the mines of the Marquette district, whose port is Marquette; 45 miles in the case of the mines of the Penokee-Gogebic district, whose port is Ashland; 70 to 84 miles in the case of the mines of the Mesabi Range, and 80 to 90 miles in the case of the mines of the Vermilion Range, whose ports are Duluth, Superior and Two Harbors, about 100 miles in the case of the Canadian mines tributary to Fort William and Port Arthur and as yet largely undeveloped, and 12 miles in the case of the mines of the Michipicoten district, whose ore is shipped from Michipicoten Harbor, and smelted at Sault Ste. Marie, Canada. This latter is the only case where steel is produced in the Lake Superior region from the ore which is mined there, although pig iron furnaces run by charcoal have been in operation at Ashland, Marquette, Duluth and many other points in the Lake Superior region from its discovery.

The shipping of the copper ores from the mines of Keweenaw Peninsula, also, has the advantage of having the stamp mills at lake level, and bringing the ore down a gravity road to a place from which the copper can be shipped directly by boat or by railroad.

Thus the heavy iron and the copper ores are always brought down-grade and the empty cars hauls up-grade, which is very much easier than if the loaded cars had to be carried up.

Practically all of the railroads, with the exception of the spur lines which run into the mines, and, therefore, have in some cases rather steep grades for short distances, have been able to construct their lines with a smaller degree of expense than is the case with most railroads going into mineral-producing regions. The railroads of the Rocky Mountains, for example, are obliged to go to great expense to reach the mines, though in the case of railroads reaching many coal fields, the expense of construction is in general rather smaller.

The Canadian Pacific Railway and the Canadian Northern Railway (and the Grand Trunk Pacific, now being constructed), are able to transport their produce from the Canadian wheat fields to Fort William and Port Arthur, the ports on Thunder Bay, Canada, and

the Northern Pacific and Great Northern are able to carry grain from the wheat fields of Minnesota, the Dakotas, and adjacent states to the ports at the head of Lake Superior at comparatively small expense. The railroads which enter the region to carry out the lumber have had a similar history of being able to reach the forests or saw-mills without building unduly expensive lines. The rather low relief to which the country had been worn down is responsible for the fact that so great a number of railways have been able to build their net-work of tracks (Fig. 1) across this comparatively unsettled country, and to compete with one another profitably.

USES OF SWAMP LANDS. The enormous areas of swamp land, where great deposits of peat are found, are due directly to the



FIG. 9—Lake of the Woods on the International Boundary. Such lakes are a great asset in the lumbering industry.

Glacial Period. Some of these swamp lands, especially in Minnesota, have been recently mapped and studied in view of their potential possibilities as reclaimable farm lands, as sources of permanent water supply, and as producers of peat. C. A. Davis has studied the peat of the upper peninsula of Michigan.* The uses of peat as a fuel, as a fertilizer, in making paper, etc., and in generating illuminating gas are worth considering, but especially the use of peat coke in relation to the iron industry. This latter is already beyond the experimental stage in European countries, where peat coke is much in demand because it has all the advantages of charcoal.

* Geol. Survey of Mich., *Ann Rept.*, 1906, 183-286.

INFLUENCE OF GLACIATION ON LUMBERING. Reference was made in a preceding paragraph to the influence of the glaciers upon the lumbering industry. Every one conversant with the principles of lumbering can realize what it would mean to the Lake Superior region if there had been no lakes there. Just what the relationship of the amount and kinds of forests to the soil and to the rather sluggish streams produced by the glacial invasion may be, will not be discussed, although it is suggested that the sandy soil which supported such a growth of gigantic pines is a factor in this connection. The principal point to be noted, however, is the fact that if it were not for the great number of regulated streams, the driving of logs to the saw-mills in the spring would not have been possible, and without the innumerable lakes (Fig. 9) the storage of these logs for sawing during the summer would also have been curtailed.

WATER POWER DUE TO GLACIATION. It is probable that before the glacial invasion most of the present waterfalls did not exist. These falls now furnish the water power upon which many of the smaller saw-mills depend. Moreover, the greater amount of water power produced by the diversion of a stream so that it plunges down over the rock ledge which it either did not encounter or had cut away before the Glacial Period, is significant in connection with the growing use of electricity generated by water power which is becoming so prevalent. In the future this natural resource of water power in the Lake Superior region will doubtless be taken advantage of to an even greater extent. Water power on the St. Louis River (Fig. 10), which descends 456 feet in about six miles, now runs an electric plant which lights Duluth, about twenty-five miles away, and runs its street car lines. The project of running the railroad lines, which carry the ores of the Vermilion and the Mesabi Ranges to the shipping points, by electricity generated by the head of water which descends at various points from the highlands north of Duluth to Lake Superior, may even be carried out within a few years. This could be done to equal advantage in the case of several of the other iron ranges. Manufacturing, especially in view of the geographical association of a raw product, like iron, with water power might be a notable future industry of this region, though in the absence of coal it seems unlikely to become a great industry; nor will it ever pay to carry the coal to the ore rather than the ore to the coal, as is done now.

The government, in coöperation with various State bureaus like the Wisconsin and Michigan Geological Surveys, is already investigating the possibilities of water power as a resource of various

parts of this region, especially in Wisconsin,* in Minnesota† and Michigan.‡ They are also studying the relationship of surface water to mining, to agriculture, to health, etc. The use of some of the lakes as sources of water supply for cities, as an ice supply, and as sources of fish, may also be pointed out.

THE FISHING INDUSTRY. In Lake Superior itself, as well as in northern Lake Michigan and western Lake Huron, the fishing industry is of marked importance, giving employment yearly to about 4,000 people and furnishing a considerable food supply to the larger cities and towns and for shipping to regions outside. During 1903 the American portion of Lake Superior and the parts of Lake Michigan and Huron within the area of Fig. 1 yielded 29 million pounds of fish, for which the 2,219 fishermen received \$871,515. The Canadian part of Lake Superior doubtless yielded half as much more.§ The local income from this resource was, therefore, about \$1,250,000 in 1903.

LAKES AS RESORTS. As summer resorts, many of the minor lakes, as well as the Great Lakes themselves, are already taken advantage of, especially in northern Wisconsin and Michigan and Minnesota. They are also visited by numbers of sportsmen, who shoot ducks and other birds about these lakes, and hunt game, notably the moose and deer, in the adjacent forests.

AGRICULTURAL RESOURCES. The valley of the Red River of the North, which lies in the northwestern part of the area, occupies the bed of an extinct glacial lake (Lake Agassiz), and is one of the richest wheat lands in the world. This suggests the possibility that in the future more advantage will be taken of these regions as seats of agriculture. The Bureau of Soils of the United States Department of Agriculture, as well as the State Geological Surveys of Michigan and Wisconsin, and the Agricultural College of the University of Wisconsin and adjacent colleges have been studying

* L. S. Smith: "Water Powers of Northern Wisconsin," *Water Supply and Irrigation Paper* 156, U. S. Geol. Survey, 1906; *Bull.* XX, Wis. Geol. & Nat. Hist. Surv., 1908; Barrows and Horton, *Water Supp. and Irrig. Papers* 156, 206, 1907, 20-26; Horton and Follansbee, same, 207, 1907, 50-65.

† R. B. Dole and F. S. Wesbrook: "The Quality of Surface Waters in Minnesota," *Water Supp. and Irrig. Paper*, 193, U. S. Geol. Surv., 1907; Horton and Follansbee, same, 207, 1907, 39-50.

‡ Frank Leverett: "Flowing Well Districts in the Eastern Part of the Northern Peninsula of Michigan"; A. C. Lane: "Waters of the Upper Peninsula of Michigan," *Water Supply Paper* 160, U. S. Geol. Surv., 1906, 29-53; *Ann. Rept.*, Geol. Surv. of Mich., 1903, 113-167; Barrows and Horton, same, 206, 1906, 17-20, 35; A. C. Lane: "Water Resources of the Lower Peninsula of Michigan," *Water Supply and Irrig. Paper* 30, U. S. Geol. Surv., 1899; and the various earlier bulletins of the same bureau on the progress of stream measurements for different years.

§ "Statistics of the Fisheries of the Great Lakes in 1903," by A. B. Alexander, *Appendix to the Report of the Commiss. of Fisheries to the Sec. of Commerce and Labor for 1904*, Washington, 1905, 643-731.

the soil conditions in the vicinity of the northern lakes, and have already published several maps and reports.* These investigations often lead to the production of more profitable crops than those raised in one place, or in the production of crops where nothing is now raised.

These lands are already being taken advantage of in parts of Minnesota, by European emigrants by whom the vacant lands of northern Minnesota, Wisconsin and upper Michigan are regarded as offering an inviting opportunity. Numbers of inhabitants of northern and western Europe who come to the iron ranges to work in the mines, have already begun to buy cut-over lands from the lumbermen for farms. More than that, great regions which are unfit for agriculture and from which the forests have already been stripped are a possible future timber reserve which will either reproduce the forests which have been cut or burned away, or will be reforested by the people of the United States, whose lumber resources are already within sight of exhaustion. These lands on the watersheds bear an important relationship to the flow of the streams rising there. The State of Wisconsin already has one of the largest State forest reserves near the divide of the Mississippi. Lake Superior and Lake Michigan drainage.

CITIES. As a result of the various sorts of activities in the Lake Superior region, five kinds of settlements have grown up, different in the quality as well as in the length of life promised them. The first resource of this region, the fur trade, resulted in the first type of settlements,† trading posts, such as those of various French and English companies, including the Hudson's Bay Company. These posts have many of them seen their time of prosperity and are now abandoned. Fort Charlotte, Minnesota, on the grand portage, was of this type, as was also Fond du Lac, at the head of navigation on the St. Louis River of Minnesota, which was founded very early by the Hudson's Bay Company, and on whose site a small modern village stands. Nipigon, another Hudson's Bay Company post, still maintains a small trade. On the sites of certain of these fur-trading posts, however, permanent towns have been built for other reasons.

With, and after these, came the second type of settlements, the missions, some of them later becoming forts, like Michilimackinac. L'Arbre Croche, Fort La Baye at Green Bay, the fort at Sault Ste. Marie, etc.

* "Soil Surv. of the Munising Area," Mich., 1905; "Carlton Area," Minn.-Wis., 1906; "Superior Area," Wis., 1905; "Portage County, Wis.," 1906, etc., U. S. Dept. of Agric., Bureau of Soils.

† Even preceding the Jesuit missions. See F. J. Turner, "Character and Influence of the Indian Trade in Wisconsin," Johns Hopkins University Studies, Vol. 9, p. 569.

In connection with the lumber industry, towns of the third type were built at many points, as, for example, at Grand Rapids, Minn., and throughout upper Michigan and Wisconsin and Ontario. Not a few of these towns have also been abandoned, as the reason for which they existed has disappeared with the cutting off of the timber (Fig. 8); but on the sites of some of these towns, also, permanent settlements have been built. The paper mills near Grand Rapids, Minnesota, and the furniture factories at many Wisconsin and Michigan towns came there because of water power and



FIG. 10.—St. Louis River, looking North, near Thompson. Rapids now used to generate electricity for long distance transmission.

available lumber and wood pulp. In the lowland, eastern portion of the upper peninsula of Michigan, which Rominger described as an unbroken forest* in 1873, there is almost no forest left, and settlements are sparse. During the cutting of the lumber, a considerable temporary population peopled the region, into which an agricultural population is now slowly going, with the establishment of agricultural centers of population that are replacing the lumber towns.

As a result of the mining industry, the fourth class of towns

* Carl Rominger, *Geol. Survey of Mich.*, I, 1873, Part III, page 8.

were built up. The iron mining towns (Fig. 1) include Tower and Ely in the Vermilion district; Virginia and Hibbing on the Mesabi Range; Brainerd in the Cuyuna district; Hurley, Ironwood and Bessemer in the Penokee-Gogebic district; Ishpeming and Negaunee in the Marquette district; Crystal Falls, Iron River, Florence and Iron Mountain in the Crystal Falls, Iron River and Menominee districts. Copper mining towns are Houghton, Hancock and Calumet on Keweenaw Peninsula. Some of these towns, now flourishing, are destined to disappear, as the ore which determined their location becomes exhausted. As an example of a settlement which was first a fur-trading post and then a lumber town, and still later a mining town, Tower, Minn., may be cited. With the extinction of the fur-bearing animals in large numbers and the diminution of the lumber and the iron ore, Tower has had a decline in recent years, and would probably eventually be abandoned were it not the logical site for a summer resort, and a starting point for camping and hunting expeditions. Its beautiful location on Vermilion Lake, at the beginning of a long canoe route over lakes and streams, probably will insure there always being a town at Tower.

Numerous smaller places which have been centers of population because of the fur, lumber or ore, might be cited. The fur-trading posts, missions and forts are many of them gone, though large cities with other reasons for existence stand on the sites of a few; the lumber towns, as such, are fast going out of existence; and the beginning of the abandonment of some of the mining towns is in sight.

The fifth class of towns in this region are those which owe their location to their being commercial centers, *i. e.* shipping points for ore (Fig. 3), gathering or distributing points for agricultural communities (Fig. 4), manufacturing towns with location determined by raw materials and water power (Figs. 7 and 8), or else places of transfer of goods from railway trains to sailing vessels or steamers, especially iron on its way to coal fields or to markets (Figs. 3, 4, 7 and 8). In this class is a great number of large and prosperous towns, the largest and best in the whole region (Fig. 1). Among these, Duluth, Minn., is easily the leading city, and with its twin city, Superior, Wis., has a population of nearly 119,000, the latter city having a notable ship-building industry and many flour mills. Ashland, with a population of about 14,000; Marquette, with a population of 11,500; Fort William and Port Arthur, together with a population of 7,000; Houghton and Han-

cock, with a joint population of 14,000; Escanaba, with a population of 13,000; Sault Ste. Marie, Mich., and Sault Ste. Marie, Ont., with a joint population of nearly 20,000, are all cities which have other reasons for their existence than the exploitation of the expendible resources like fur, lumber and ore, and which, therefore, promise to continue to be centers of population and to increase in size and in prosperity even after all of the iron and copper ores of the lower grades have been shipped.

Away from Lakes Superior and Michigan are the twin cities of St. Paul and Minneapolis, which together have a population of 516,000, and the smaller cities in Minnesota, Wisconsin and Michigan (Fig. 1), like Winona, Eau Claire, Chippewa Falls, Grand Rapids, Stevens Point, Wausau, Menominee, Marinette, Green Bay, Oshkosh, and many others which at the present time have reasons for existence which are related to other things beside the development of the mineral, forests and agricultural resources of the Lake Superior region, and whose relationships will not, therefore, be discussed in this paper.

THE FUTURE OF THE REGION. It is enough to say that the region under consideration, with a sparse population, of which a large percentage is now concentrated in a comparatively small number of cities and towns in proportion to the very great area, will in the future come to support a population many times as great and probably less centralized. This will doubtless come when the local agricultural lands begin to produce the food of the mining towns. The region east of Marquette, for example, might produce vegetables, fruits and dairy products for that mining center. The foodstuffs used at Marquette are now largely obtained from Chicago, to which they are shipped from some other agricultural district. Eastern Minnesota farms might feed Duluth, Superior, and the iron range towns, instead of having the foodstuffs of these towns largely reshipped from St. Paul and Minneapolis.

In the future, the favorably located places will continue to grow, and the unfavorably located places will decrease in size. The vacant intermediate areas, however, should come to be occupied by larger and more permanent populations of farmers, factory hands, etc., so that the proportion of people living in the cities and towns will probably not continue to be predominant, and the empty areas will gradually be filled up with a population having other pursuits besides those involved in the development of the mineral resources of the region, in which much concentration has already taken place.*

* H. R. Mussey: "Combination in the Mining Industry," *Columbia Univ., Studies in Hist. Econ. and Pub. Law*, XXII, No. 3. 1905, 1-167.

The natives, the fur-traders, the priests, the soldiers, the lumbermen, the fishermen and the miners have opened the region. It remains for agricultural and commercial pursuits to make use of it to its greatest capacity and continue the progressive development and utilization of its resources.

MAPS OF PRIMITIVE PEOPLES*

TRANSLATED FROM THE RUSSIAN AND ABRIDGED BY

H. DE HUTOROWICZ

This quarto volume is a work on the origin and development of the map. A map which N. L. Gondatti brought from the Tchuktchi country, northeast Asia, in the basin of the Anadyr River, suggested the idea of writing it. The author gave special attention to primitive maps when he was studying with Ratzel in Leipzig and also during his cartographic studies. After examining the Tchuktchi map in the Anthropological Museum of the Moscow University, he endeavored to find primitive maps in Berlin, Paris, Rome, Dresden, London and other cities, but found only three maps of the Marshall Islands in the Grassi Museum of Leipzig. In 1907 he found in Stockholm maps by the Greenland Eskimo and then succeeded in procuring for examination the Grösser collection in Berlin. About that time the Khatanga expedition of the Imperial Russian Geographical Society returned with a large collection of maps made by Samoyeds, Tunguses, Yakuts, Dolgans and three maps from the Kolyma R. region now at the Museum of the Imperial Academy of Sciences at St. Petersburg. He also found at this museum Rink's Eskimo map. All this material, together with maps sent by American scientific institutions, completed the collection used in preparing this work. It embraces fifty-five maps from Asia, fifteen from America, three from Africa, forty from Australia and Oceania and two from the East Indies.

Good eyesight and a highly developed gift among primitive peo-

**Izvestia Imperatorskavo Obshchestva Lubitelei Estiestvoznania, Antropologii i Etnografii, sostoyass hazo pri Imperatorskom Moskovskom Universitetie. Tom CXIX. Trudy Geograficheskavo Otdielienia. Vypusk II. B. F. Adler. Karty Pieruobytnyh Narodov, S.-Peterburg, 1910.*

(*Bulletin of the Imperial Society of Students of Natural History, Anthropology and Ethnography, at the Imperial University of Moscow. Tome CXIX. Works of the Geographical Section, Number II. B. F. Adler. Maps of Primitive Peoples. St. Petersburg, 1910. viii and 350 pp.*)

ples of finding their bearings have helped to evolve cartographers among them. Many travelers have observed what some of them call "telescopic" eyesight among these peoples. A Yakut distinguished with the naked eye stars in the Pleiades not usually seen without a telescope. The Yakuts say there are many stars in this group, but only seven large ones. The Buriats guide their movements by the pole star at night and the sun by day. According to Mr. Jochelson, the natives of northeast Siberia usually find their bearings by the rise and setting of the sun, and by the stars at night. Caravan guides in the Sahara and Indians in the forests of Bolivia find their way under the most difficult circumstances. As for the Eskimos, their topographical aptitude is extraordinary. They have a large knowledge of the stars; and climbing to the tops of hills or mountains, they mark localities on their maps which are hidden from view at lower levels.

But many primitive peoples do not make maps though they have a good idea of the topography of their countries. The natives of the Andaman Islands have a well-developed sense of location, but not a single specimen of map-drawing. But the desire to express on a small scale some sort of a picture of the part of earth they live in is widespread. Some tribes carve maps out of wood, as the natives of east Greenland, some of the North American Indians and many Polynesians. When a traveler asks for directions to reach this or that place many Indians of South America, Negro tribes, Siberian natives or Australians rapidly sketch a map on the sand or snow, paper or birch bark. They seem to think that this graphic delineation will be more helpful than mere verbal guidance.

The Tchuktchi collection from the district of the Anadyr includes two specimens of maps drawn with reindeer blood on wooden boards. Both maps show the delta of the Anadyr. Mr. Adler describes the drawing as carefully done. The winding course of the river, the vegetation on the shores, fords, hunting-places, etc., are easily seen. The complicated delta with its numerous islands is faithfully reproduced. Two parallel lines show the shores, but the Yakuts, Samoyeds and some other tribes draw a river with one line. Many splashes of red on the shores, no doubt indicate hills. The map picture is enlivened by hunting and fishing scenes. At one corner is a group of three huts, fishing nets are spread in the middle of the river and a herd of swimming reindeer is shown. Mr. Adler asserts that the map in its general features compares, not unfavorably, with a map of the same region made by the Russian Ministry of the Marine. This product of the Tchuktchi, unfamiliar with draw-

ing instruments and correct methods, is a fine example of the cartographic art of primitive man.

Because ethnologists have shown the close relationship between the Tchuktchi and the Eskimo, Mr. Adler leaves his discussion of the maps of other Asian tribes at this point to treat at length of the Eskimo as map makers. He describes a map in R. Andree's "*Ethnographische Parallelen*" made by the Eskimo Kalliherua in the winter of 1850-51. Drawing his map with a lead pencil, the first he had ever seen, he showed the coast line from Pikierlu southward to Cape York with noticeable approximation to the truth. Then he discusses examples of other Eskimo maps found in the works of Nelson, Hall, Boas, Rink and others. Boas found much to commend in the maps of the Eskimo with whom he lived in Baffin Land. In answer to his geographical questions they would often begin at once to draw a map, sometimes on the snow. Five maps in the Boas collection are of Cumberland Sound, made by different Eskimo, and their similarities indicate care and considerable skill in the delineation of these coasts. The fiord character of Frobisher Sound and the mass of small islands and little bays are well indicated. The hatchings on some of the maps doubtless indicate the high elevation of the shores. When Beechey asked for information of the Eskimo of Kotzebue Sound they drew a map for him on the sand. They sketched a shoreline with a stick and divided it into equal parts, each part representing a day's march. They showed hills with heaped up sand and stones and made an island with pebbles. Many on-lookers made suggestions as the work went on.

All this was of the nature of a relief model, and the East Greenlanders, especially, make their maps in relief by carving them on boards that are drifted to their shores. They have the idea that relief maps represent nature more faithfully than other maps. Holm took home to Copenhagen three specimens of these reliefs. Of course the fundamental purpose of all these primitive maps is to show routes to hunting grounds, fisheries, settlements, etc. These East Greenlanders live on or near the coasts of fiords, and their routes are along the fiords or across them, at convenient places; so their relief maps mainly represent deep and narrow valleys and the intricate nature of the region is well shown in their deeply carved bits of wood on which they try to represent nature on a small scale.

Continuing his description of maps made by tribes of northern Asia, Mr. Adler gives special attention to the Tungus maps that were brought to Russia by the Khatanga expedition, and he is the first to reproduce specimens of them. Prince Kropotkin, P. E.

Ostrowski and others agree that the Tungus make maps with much skill, and Kropotkin says that during his travels in Transbaikalia he was greatly assisted by the information he found on a Tungus map that had been drawn on birch bark. None of the natives who drew the fifteen Tungus maps that appear in Mr. Adler's work had ever seen or heard of our cartographic products. They orient their maps not in accordance with cardinal points but with relation to the prevailing direction of the chief water artery. Like all maps of primitive or ancient peoples, a Tungus map is truest of the region best known to the map-maker, and this region is usually shown in the central part of his map, so that nearer the border, distances and surface features are likely to be less accurately shown. On the whole, however, the Khatanga expedition and Mr. Adler found a great deal to commend in the maps.

Among the other maps secured by the Khatanga expedition were three made by descendants of Russian peasants who are on the same cultural plane as the natives. Their maps are poorly drawn and in all respects are inferior to those of the aborigines. The Ostiaks, Gilaks, Ainy Karagoss and Soïots are mentioned among other Siberian peoples as having some aptitude for cartography, and specimens of maps from southern Sakhalin are given. The Turkoman peoples orient their maps exclusively by the main direction of the mountain ranges. Other peoples of North Asia, such as the Mongols and Buriats, draw maps only when requested to do so, though they have an excellent idea of direction. Several specimens of their maps show Buddhistic or Chinese influence, indicate every inhabited place, and mountains are sketched in the Chinese manner without perspective.

The maps made by the Indians of North America are strikingly similar to those made by the Yakuts, Tungus and other peoples of North Asia. Though Kroeber said that these Indians do not make maps, the author quotes Carver and several other authorities to show that the contrary is the case and that they draw route and other maps on sand, bark, leather, etc. Prof. Chamberlain has recently written that the Kootenay Indians of British Columbia have much cartographic aptitude. When he showed them a map of their country they at once pointed out the principal mountains, lakes, rivers and other features. They make good cartographic sketches. Eustace Jacobs says his Indian guides made good map sketches of regions they had traversed only once. Mr. Adler reproduces six maps (after Pickering) of the Oregon Indians. The guiding line is a river, lake or drainage system. Mountains also are sometimes

used for orientation, forests are rarely shown, but human habitations and the best hunting districts are indicated.

The Indians of South America are not far behind the tribes of the northern part of the western world in map-making. Specimens of their maps are shown in the books of Karl von den Steinen, P. Ehrenreich, M. Schmidt and Dr. Koch-Grünberg. A large collection has also been made by Dr. H. Meyer, who intends soon to publish his material. In the basin of the great Xingu tributary of the Amazon, the natives show rivers by straight lines, and lines across them mean waterfalls or swift currents. It is important to indicate them, because they are obstacles to navigation. When an old Indian was asked to tell what tribes live along a part of the Xingu River, he drew in the sand a map of the river and showed the location of the various tribes along its banks. With the aid of Indian maps, Prof. von den Steinen was able to trace the inter-dependence of the Kulisehu and Kuluene Rivers. In mapping the sources and upper tributaries of the Rio Negro, Dr. Koch-Grünberg derived some assistance from the maps of the natives. A particularly striking map, reproduced by Mr. Adler, shows the Caiary-Uaupes River at the point where it falls into the Caduiari River.

The natives of Africa are seldom mentioned in the literature of primitive map-making. Largeau says that the natives of the Sahara help out their narratives by drawing maps on the sand. One map shows the Ahoggar Range in the Central Sahara, which has only recently been well mapped by the French. On this map four parallel lines represent meridians, a fact that surprised Largeau, though Mr. Adler thinks it is not strange, as Arab traders have long disseminated geographical and cartographic ideas in the Sahara. A map drawn for Clapperton by the Sultan of Sokoto shows the Quorra or middle part of the Niger and the bordering regions. Beck brought home a map made by an Abyssinian showing the Godjeb as the upper part of the Sobat River, which is not the case.

Explorers have obtained a considerable number of maps made by Bushmen of South Africa and the Bantus of Central Africa. The chief of the Bakubas made a rather remarkable map of a part of the Sankuru River system for Dr. L. Wolf, the explorer of the Sankuru. Prof. K. Veule, one of the explorers of German East Africa, obtained several native maps. One of them shows the German colony throughout its east and west extent and Prof. Veule regards it as a remarkable product. [It certainly contains a great deal of information, though it is full of blunders. The map-maker appears to have faced the south during his work, so that the bottom of

the map is really its northern edge and his east and west directions are similarly transformed. He has laid down a number of caravan routes, names the tribes and the settlements along them and differentiates the houses of white men from the huts of the natives. He has some notion of scale and his east and west distances are not very erroneous, but the actual distances between stations and settlements is still badly distorted by the fact that some of his places are several degrees of latitude from their proper positions.—EDITOR]. Another map, reproduced by Mr. Adler, of the region lying around the southern end of Lake Tanganyika is declared by Prof. Veule to be astonishingly good, considering that it is the product of an untutored native.

Australian natives show distinct map-making aptitudes. They are good observers and thoroughly know the regions they inhabit. Dr. Jung says that in his travels around Lake Eyre and along the Darling, Warrego and Murrumbidgee Rivers he met natives among the various tribes who made for him good sketches of the route ahead. Dr. Neumayer found to be serviceable a native map, specially prepared for him, of a route he was about to follow near the lower Murray River. Ratzel wrote of the topographical talent of the Australian natives and said their "eye memory" made them geographers.

But the natives of Oceania surpass the Australian natives in map results. This is not surprising, for in their travels along the island coasts and from one island to another they must observe minute details of coasts, atolls, reefs, etc., in order to navigate intelligently and safely. The Polynesians are especially distinguished as travel-geographers. Native maps have been reported from many islands and groups, *e. g.*, New Zealand, Fiji, the Marshall, Palau and Ladrone groups, etc. The Maori have much geographical instinct. They made a map of Lake Rotokakahi for Hochstetter, and though their contours of the lake were not entirely correct, he found the map a good specimen of primitive work. The Palau Islanders make a sort of relief map of their islands. Adelung says these reliefs were helpful to the Spanish missionaries when the islands were discovered in 1696. A native map of Tahiti published by Forster is well known. Ratzel says that though this map gives names correctly, it misrepresents the size and position of islands in the Society Group. The map is cited, however, as throwing light on the spread of the Polynesians to the West.

The Marshall Islanders have always been unwilling to explain their maps, and they are hard to read, but the investigations of

Winkler and Schück seem to afford a good explanation of them. These maps consist of wooden sticks fastened together, at various angles, with shells and small stones. Winkler divides them into three groups: 1. Maps of the entire group; 2. Maps showing parts of the archipelago; 3. Charts used in navigation. The positions of the sticks give a variety of information, much of which is still obscure, but it is known that they indicate places where the combers fall most violently upon the shores. They show other movements of the sea, also distances between the islands; in fact, they are charts made by a sea-faring people to help them on their way and diminish the dangers of their voyages. These remarkable maps are well represented in European Museums.

Mr. Adler gives many pages to an examination of the so-called prehistoric maps that have been discovered. He inclines to the view of Fr. Rödinger that the two pieces of split bone covered with a network of lines, among the cave finds of Shafhausen, were meant to designate routes in some locality. A. Ernst maintains that many of the petroglyphs of Venezuela were intended to represent topographic forms; and Bastian believes that many of the petroglyphs discovered in Columbia are elementary maps. It is thought also that many Siberian petroglyphs show parts of the Yenisei River. Koch-Grünberg, P. Andree and others say they do not believe that carvings on rocks, many of them involving great labor, were made for mere pastime, and they agree with Shurz that not a few of them were "rude and awkward attempts at map-making."

Mr. Adler also compares, at length, the maps of the semi-cultured and cultured peoples of antiquity with those of the primitive peoples of to-day. In his opinion some of the maps produced in ancient Mexico and Peru were better and more serviceable than those made by Europeans in the Middle Ages. The Mexicans made maps, sea charts and cadastral plans that were better than those of the Persians. The Peruvians made relief maps of stone, clay and straw, but their work was inferior to that of the Mexicans. The cartography of the ancient civilizations of America appears to have had no influence upon the work of the modern primitive Americans. The Inca and Aztec cartography was entirely original, uninfluenced by any foreign models.

Assyro-Babylonian maps profoundly influenced the geographical knowledge and attainments of the Egyptians. Among these maps reproduced by Mr. Adler are a map of Babylon with text and a plan of the fortress of Babylon. Jewish cartography also was greatly influenced by the cartographic products of Babylon and Egypt.

Geography could not develop independently in small Palestine, but the country was on the main route between the two powerful nations to the east and west, and their geographical knowledge and ideas became those of the Jews. Carl Ritter was among those who believed that a map of Canaan was produced, though there is no direct evidence of it in Josephus. Herodotus mentioned that the old Persians made maps, though the Persians of to-day are poor cartographers and poor geographers as well. The geographical knowledge of ancient India shows both Babylonian and Chinese influence, and the Brahmins made maps of the world and of various regions. The oldest map of India, according to Ritter, was in the form of a lotus flower floating on the water. A map made by a Nepal native and described in the *Annales* of the Musée Guimet is a valuable document showing mountains, rivers and their confluence, routes, temples, towns, etc. A better map of India from a technical point of view was that presented to Warren Hastings in 1772. Some of these maps lack lines of latitude and longitude, have no scale, and mountains and rivers are shown by lines.

Historical documents show that the Chinese made town plans and drew maps as early as 3,000 B. C. None of these ancient documents have been preserved, as they were of the nature of secret papers, and many were intentionally destroyed. Two maps on stone are supposed to be the oldest in existence. They were discovered by P. G. Maurice and described by E. Chavannes. Both are reproduced in Mr. Adler's work. One of them has the title: "Map of China and of Foreign Lands," but shows only China and Korea and place names in other parts of the near-by world. The other shows places, mountains and rivers mentioned in the famous chapter of Chou-King entitled "Tribute of Yu." North is at the top of the map, in contrast with many other Chinese maps showing South at the top. Comparison of these with modern Chinese maps, in Mr. Adler's opinion, shows that the Chinese have not made much progress in cartography. [This, however, is certainly not true of recent Chinese maps, which show that Chinese cartography is becoming profoundly influenced by western methods.—EDITOR]. The Chinese had some astronomical knowledge, were good draughtsmen, and d'Anville called them the best cartographers in Asia.

Japanese maps antedated the oldest European work. The monks began to make maps soon after the introduction of Buddhism into Japan. Their acquaintance with Dutch and Portuguese traders helped them to attempt maps of the world. The maps they make to-day are as good as those of Europe.

Ancient Egypt bequeathed us an interesting type of map of which a considerable number still exist in the Turin and other museums. Mr. Adler reproduces two of them and gives a long description of the oldest yet found—a map showing the gold-bearing districts between the Nile and the Red Sea near the southern border of Upper Egypt. The Egyptians were strongly influenced by Arabian and Greek geographers and cartographers of whose maps we have no copies and all we know of them is from the writings of Herodotus, Aristotle and others. According to these references, all ancient Greek maps were round wheel maps. The later Romans improved upon the work of the Greeks. A fine example of a Roman map is the *Tabula Peutingeriana*, made in the reign of Augustus. It is interesting to compare this map with the sketch maps of primitive peoples. They differ greatly in the fact that the Roman map attempts to show the whole world as then known, while primitive map makers confine themselves to regions with which they are acquainted; but both are alike in having no degree nets, and in being little more than sketches of routes; and in both cases, the author tries to present the information of greatest importance to himself, other facts being almost ignored.

Ptolemy's maps were a turning point in the history of geography. They were superior to many maps of the Middle Ages. His work stimulated geographical research among the Arabs and, during the Renaissance, helped the development of cartography in Western Europe. The early maps of the Arabs show much knowledge of geography and care in drawing. They cannot be compared with the maps of primitive peoples, for many of them have a scientific basis, show astronomical determinations and represent vast areas. One Arab map, however, which attempts to show the course of the Nile from source to mouth, made in 1636, much resembles the primitive maps of to-day.

The maps of the Middle Ages have much in common with the maps of the early Greeks and Arabs and most of them were made by monks. The transition period, when map projections were introduced and surveys and measurements of the earth's surface began, connects the maps of the Middle Ages with modern map-making. It may be said, in a general way, that a comparison of the maps of civilized peoples in the old times with those of illiterate natives of the present day will often be in favor of the latter. The late Prof. S. Ruge, comparing the maps of old Germany with the primitive products of to-day, said that the maps made by Indians, Polynesians and Eskimo are more nearly correct than maps made by monks of the Twelfth century.

Summing up his long array of facts, Mr. Adler says that in the maps of primitive peoples, as a rule, we do not get the true orientation because bearings are based on the general directions of rivers, sea coasts, mountains, etc. The Yenisei Ostiak and the Marshall islanders are beginning to orient their maps by the cardinal points. The use of the compass is not generally known, but, when introduced, the natives at once see its advantages.

The materials used by primitive peoples depend on many conditions. Clay, sand and snow were first used in sketching maps, and these products most nearly approached those carved on stone. The Babylonians made maps on stone or baked clay even after parchment was known, preferring the durability of stone. Many of these maps have been preserved, while the wooden tablets of the Greeks and Romans have disappeared. The oldest Chinese maps were engraved on bronze urns, but as they were heavy, wood began to be used. Where the art of converting timber into boards was not known, bark was employed, and this is still used among nomad peoples. Later, maps drawn on leather or skins, textile fabrics and paper came into use. Among Mexicans, Chinese, Peruvians and others, maps on bark, wood or metal tablets were superseded by cotton and silk materials.

Tools used for drawing maps were first the finger tracing lines on sand or snow, then a stick, then a knife to carve wood. Then sticks dipped in coloring matter, pencils, charcoal, soot mixed with grease, etc., came into use.

The map technique of primitive peoples is naturally very simple as compared with our complicated processes. The technical requirements of a modern map are so great that in Germany, where the best maps in the world are made, three years frequently elapse from the time of the first survey drawing to the final printing of the map.

We make large and discriminating use of colors on maps, and different colors and different shades of the same color are used to express a large variety of meanings. A variety of colors is not found on the maps of primitive folk. Only one map is known, a Tchuktchi map already mentioned, which is colored with reindeer blood, on which deeper tints are used for fords, mountains, and the edges of forests.

Rivers and lakes are more likely to be shown than any other natural phenomenon. Sea coasts are often very incorrectly given, owing to the unfamiliarity of many tribes with coasts.

Routes come first among anthropogeographical elements shown.

Footprints are given to show the direction of movement; also sledge hunting roads in snow-covered countries; animal paths and fording places and human habitations, whether in the northern tundra or the tropical forest. A fish drawn on land means that there is fine fishing in the neighboring waters. Groups of dots on Wissner's Eskimo maps show where musk-ox herds may be found.

It is impossible in this brief summary to give an adequate idea of the thorough and detailed study of the primitive and early phases of map-making, the results of which are given in this quarto volume of 350 pages. The work embodies the fruits of the most exhaustive examination of this important subject that has yet been made. The author says modestly, in conclusion:

"The considerable material collected and presented here by us speaks for itself. If it should awaken further interest and stimulate further research and investigation, or be used as the basis for other works, we shall feel amply rewarded."

NOTES ON THE DESCRIPTION OF LAND FORMS.—VI.

A CUESTA IN MIDDLE GERMANY. DER STEIGERWALD: ein Beitrag zur Geographie Frankens, by J. Schwender (*Forsch. f. Deut. Landes- u. Volkskunde*, xvii, 1908, 1-118). The studies of German geography, among which the one above cited is published, are now approaching their twentieth volume. They consist of a series of essays by experts on various local themes, accepted with the sanction of a Central Commission for Scientific Geography in Germany, edited at present by Professor Hahn of Königsberg, and published by Englehorn in Stuttgart. The *Forschungen* may therefore be regarded as presenting the various methods of treating geographical problems that are accepted as scholarly and effective by German geographers of high standing. An essay by Sölch in a recent volume was reviewed in the fifth number of these notes, as an illustration of the helpful use of deduction, in addition to other mental processes, in geographical presentation. The essay here cited shows how greatly an approved method of treatment of land forms may vary from the deductive treatment employed by Sölch.

A part of Franconia in northern Bavaria, which, with respect to neighboring cities, lies between Würzburg, Bamberg and Nürnberg—or which, with respect to rivers, lies between a north bend of the Main and its southern branch, the Regnitz; or with respect to dimensions, measures about 70 kil. north and south by 50 kil. east and west; or with respect to structure, occupies a north-central part of the broadly truncated monocline of strong and weak strata that dip gently eastward and southeastward from the fundamental crystallines in the

stripped highlands of the Odenwald and Schwarzwald on the west, toward the strong cuesta determined by the uppermost resistant members of the monoclinical series, and known as the Franconian and Swabian Jura on the east; or with respect to topography, is finely portrayed on sheets 531 and 548 of the "*Karte des deutschen Reiches*," 1:100,000; or with respect to geology, is shown on sheets 18 and 23 of Lepsius' *Geologische Karte des Deutschen Reiches*, 1:500,000—contains a beautiful example of a maturely dissected cuesta of moderate relief and delicate texture, known as the Steigerwald. To the south, the cuesta is continued in the Franken Höhe, but there it is of less delicate and definite expression; to the north, beyond the Main, it fades away with the change of structure encountered in the approach to the disturbed belt of the Thüringerwald.

In the district with which we are here concerned, every element of a maturely dissected cuesta of moderate relief and delicate texture is seen to perfection. Its crest, trending about north and south, and standing about 180 meters above the neighboring subsequent lowlands, maintains the fairly uniform elevation characteristic of this well-defined class of forms; its scarped western face, capped by the lower one of two resistant sandstones of small thickness, and indented by obsequent valleys in perfectly normal fashion, descends gently to the subsequent lowland worn down on the underlying weaker strata and here drained by the Main; its upland is somewhat benched or terraced, most distinctly so in the north, because the two determining resistant sandstones that maintain it are separated by a thin belt of weak marls; its very gradual eastward slope has been normally stripped of the overlying weaker strata of the monocline, which have retreated down the dip into the eastern subsequent lowland drained by the Regnitz, while the still higher and harder strata rise farther eastward in the strong cuesta of the Franconian Jura. The stripped eastward slope of the Steigerwald is, however, not smooth and even, as it might be in a young cuesta, but is maturely dissected; that is, it is elaborately carved by many beheaded consequent streams and their more numerous, somewhat insequent branches;—though for that matter it may be better to describe these consequents as resequents, in view of their presumable re-development after the far eastward retreat, probably in an earlier cycle of erosion, of the overlying Jura strata.

Guided by this description, one can imagine himself wandering over the cuesta, and easily conceive the wide prospect westward over the subsequent lowland of the Main, disclosed from the crest of the scarped slope; the picturesque re-entrants of the obsequent valley heads by which the face of the slope gains a pleasing variety of form; the occasional distant views from the uplands eastward across the subsequent Regnitz lowland to the Franconian Jura 40 or 50 kilometers distant; the long, slowly-descending strips of upland between the consequent (resequent?) valleys of eastward discharge; and the many small spurs of delicate texture between the short and somewhat irregular

branch-streams by which the sides of the consequent valleys are scalloped; all these features being conceived as having a mild expression, because the relief is at the outset described as moderate. Even an active physiographic imagination can hardly invent a more perfect type of a maturely dissected cuesta than the one that nature presents to us in the Steigerwald, in the middle of the broadly truncated Franconian monocline. When the large family of cuestas is monographed, as we hope it may be in the near future, the Steigerwald will surely have an important place as an unusually fine example that exhibits all the normal and systematic relations of structure, drainage and form, characteristic of the mature stage of cuesta development.

It is this exceptionally fine example of its prolific class that Schwender describes, partly empirically, partly genetically, in the first twelve pages of his essay—the remaining hundred pages being devoted to a more detailed discussion of population, settlement, traffic and local names. The first page, opening with the sentence:—“Steigerwald nennt man den Höhenzug, der sich zwischen Main, Aisch und Regnitz in nordnordöstlicher Richtung erstreckt”—continues with a detailed and purely empirical statement of the boundary of the district, phrased for the most part in terms of village names, but in the meantime the thing that is bounded remains practically unknown, except in so far as the vague term, Höhenzug, describes it. Then come three pages on internal structure, with abundant geological detail, all of which must be gone through by the reader not previously acquainted with the district, because it is not summarized, and not illustrated by a cross-section. Three or more pages follow on the origin of the Höhenzug, its form being still vaguely described; these pages are introduced by the elementary explanation that the overlying strata, now seen in the lower land to the east, once stretched westward over the Steigerwald, thus giving its district a much greater height, and that the strata of the Steigerwald itself once extended much farther westward, thus giving the mass a greater breadth. “The present Steigerwald is therefore only the remnant of a formerly much larger volume, and if we here treat of its origin, we must show how the small existing ridge has been produced from the once much greater mass, . . . and particularly how the retreat of the scarp in the direction of the dip of the strata is to be explained.” This somewhat apologetic statement is followed by a rather round-about explanation of the familiar lateral retreat of a monoclinical escarpment. Three more pages treat external form, and present various details regarding the scarp, the uplands and the eastern valleys, but with little relation to structure. Then the physiographic description is closed with two pages on “hydrographic relations,” in which the various streams of the district are named and briefly characterized. In the remaining pages, other problems are treated in greater detail.

Through these twelve pages of Schwender's essay, the elementary problem of the Steigerwald cuesta is treated as if it were a novelty; as if this

"Höhenzug" were a unique form. There is no hint that another *cuesta* is to be found anywhere else in the world, no intimation that *cuestas* are familiar physiographic features. The reader gains no information as to the rank of the Steigerwald among its relatives; no intimation as to its being higher or lower, stronger or fainter, simpler or more complicated than other forms of its kind; not a suggestion even that it is a member of a class of forms. It stands alone; a waif, a foundling. There must, of course, be some good reason for the adoption of this method of isolated treatment by the author, for its sanction by the Central Commission for Scientific Geography in Germany, and for its acceptance by the editor of the *Forschungen*; but the reason is not immediately apparent.

A feature characteristic of isolated treatment is the insufficiency of technical geographical terms. True, in the section on internal structure, technical geological terms, such as *Schilfsandstein*, *Berggipskeuper* and *Lehrbergschichten* abound; in the mention of forests, there is no hesitation in saying that *Buchенwälder* clothe the scarp, and *Föhrenwälder* cover much of the uplands; or that *Nadelholz* prevails in one district and *Laubholz* in another; and in the account of the villages, each type of house-grouping is, following Schlüter, given a suggestive class name, such as *Strassendorf*, *Gassendorf*, *Platzdorf* and *Haufendorf*; but for the *cuesta* itself, no other name is employed than the altogether indefinite "Höhenzug." Other terms, such as "Rand" and "Abhang" for scarp, "Kamm" for crest, "Abdachung," for the slope of the upland, and "durchschnittene Hochfläche" for dissected upland, are more appropriate; but the use of these names for the parts by no means excuses the lack of a definite name for the whole.

A word used by some German writers for forms like that of the Steigerwald is "Stufe." Perhaps this term is avoided by Schwender as unsatisfactory because it is also applied by German writers to cliffs and benches of horizontal structure, while the essential features of form in the Steigerwald result from its structure being gently inclined. British usage sanctions, in a rather vague way to be sure, the use of "escarpment" for the whole mass of which the escarpment or scarp is, properly speaking, only the steeper side; confusion naturally results from giving the same name to a part and to the whole. "Lop-sided ridge" is an off-hand American suggestion that serves well enough colloquially, but that has not gained acceptance as a technical term. Veatch has recently suggested for American use the British word "wold." In the absence of any generally accepted term, Hill's earlier proposal of "*cuesta*" as a name, following Spanish-American usage, for unsymmetrical ridges of this kind has for some years seemed to me more satisfactory than any other, notwithstanding the objection urged by some that *cuesta* in Spanish means any sort of hill, and not only this particular kind of relief. A similar objection may, indeed, be used also against Richthofen's term, "*ria*" (*Führer für Forschungsreisende*, Berlin,

1886, 308), which in Spanish means, as Penck has pointed out, an open river mouth of any kind, and not specifically a bay formed by the partial submergence of a normal valley (Morphologie der Erdoberfläche, Stuttgart, 1894, ii, 566, note); yet ria has gained rather general acceptance in Germany, where *cuesta* is little used. In any case, it seems inexpedient, to say the least, to continue using vague words like "Höhenzug," or terms with other meaning, like "Stufe," or indefinite paraphrases like a "ridge of unsymmetrical slopes," for forms so definite in their relations and so common in many parts of the world as *cuestas* certainly are.

Consistent with his exclusion of a technical name for the "Höhenzug" of the Steigerwald, Schwender employs no technical terms to name the different kinds of streams by which it is so systematically dissected; and hence when streams are mentioned in the later chapters on roads, villages and so on, he has to resort to paraphrases, or else to local stream names which suggest no general relationships. In conclusion it may be fairly said that one seldom meets with a regional description in which a brief systematic introduction, phrased in appropriate technical terms and simply illustrated, would be more fitting, and in which the absence of such an introduction more seriously embarrasses a reader not already acquainted with the ground.

AMATEUR GEOGRAPHY. In *Nature* for Dec. 8, 1910, page 178, is a paragraph commenting on the recommendation made in these Notes (xlii, 1910, 671-675) that technical explanatory terms and phrases should be more generally employed in geographical articles than is now the case. The comment says, in a remonstrating tone, that explanatory terms "might be more misleading than any empirical description if employed wrongly or applied without sufficient warrant. It is not every traveller who could be trusted with the use" of such terms, even though they "may be used with good effect by a physiographer of experience."

On the same page of *Nature*, or on neighboring pages, one may read that fishing is dangerous "where *Glossina palpalis* is found"; and mention is made of a harmful insect, "*Denoderus minutus*"; also of a "grass-like umbellifer, *Aciphylla glacialis*," and of "the valuable gold-lip, *Margaritifera maxima*"; and so on, in abundance. Yet none of these scientific or explanatory terms excite remonstrance; in none of these cases is it urged that technical terms "might be more misleading than any empirical description if employed wrongly or applied without sufficient warrant"; and no fear is expressed that "not every traveller" can be trusted with the use of these learned words.

What then is the ground of discrimination against geography in this matter? Why is it that an effort to reach a fair degree of proficiency and expertness in this worthy, but undeveloped old science, arouses misgivings? Perhaps the reason is that *Nature* counfounds travellers and geographers, although it does not confound travellers and zoologists, travellers and botanists, or travel-

lers and ethnologists. But what have mere travellers to do with the question? The article regarding which the note in favor of the development and use of technical terms was written, did not appear in the records of a traveller's club, where amateurs might very properly entertain themselves and each other with dilettante narratives of their distant experiences, but in one of the leading geographical journals of the world. There, if anywhere, is it fair to look for expert geographical work; and if an article in such a journal bears the mark of the scientifically untrained traveller, and not of the trained geographer, it is reasonable to urge that it should be improved in the way of geographical proficiency.

Consider what would happen if that entertaining person, the traveller, should present an untechnical account of his observations on certain plants to the Linnæan Society, and ask for its publication in their journal; assume for a moment that publication was granted, and that the members of that learned society were thus informed regarding the occurrence of a flower, in which the flower-stems spread out from a common center, so that the blossoms met above in a gently convex surface of approximately circular border. Imagine then that a botanist on reading this naive story should suggest that "such flowers might be more briefly described as umbellifers." Would *Nature* then comment on such a suggestion by saying that "a term like umbellifer might be more misleading than any paraphrase if wrongly employed"? Comments of that kind would be perfectly true; but they would be mere truisms, and in the case of botany and zoology *Nature* would not make them. Why then, in view of the progress of these organic sciences as cultivated by experts, does *Nature* assume that geography must remain a subject for amateurs only?

My acquaintance with *Nature* extends intermittently over about forty years. I recall various occasions on which its editorials and reviews have taken advanced ground in favor of high scientific standards, and no occasion previous to the one here instanced, in which it urged investigators to restrain their efforts towards progress because mistakes might be made if their terms and explanations were wrongly employed by uninformed persons; no case in which this famous scientific journal advised that thoughtful effort towards progress in geography or in any other subject should be decreased because "travellers" are not always technically educated. To find that articles in the best geographical journals of the world are still largely the work of "travellers," little informed regarding the scientific description of the earth's surface, is already discouraging enough; but to find that *Nature* should use its large influence in favor of lagging behind with geographical amateurs, instead of urging geographers to take the pace that it sets for other sciences, is disappointing indeed.

W. M. DAVIS.

GEOGRAPHICAL RECORD

AMERICA

A RAILROAD'S FOREST ENTERPRISE. The Canadian Pacific Railway Company for years past has promoted the agricultural development of the Canadian Northwest by establishing experiment stations, demonstration farms, irrigation enterprises and in other ways. The company holds large areas of forest lands in different parts of Canada, notably in British Columbia. *American Forestry* (July, 1911) says that the company has now turned its attention also to forestry. Its purpose is primarily to develop thorough protection for the great forest wealth along the lines of the road. The necessity for this effort has been demonstrated by the enormous destruction among these Canadian forests in 1910 and other recent years. In addition to this work of fire protection the company plans also the establishment of a regular forest service to take charge of certain forest tracts and develop on them a system of forestry suited to the country, to the forest, the land and climate and to the economic conditions of the different regions in which the forests are to be selected. At present the company has in its service a number of educated young foresters in addition to its old staff of experienced timber men.

PROFESSOR BOWMAN IN PERU. Professor Isaiah Bowman is now in Peru as Geologist-Geographer of the Yale Peruvian Expedition of 1911. The general plans of the expedition have already been noted in the *Bulletin* (April, 1911, p. 287). From Santa Ana, in the Urubamba Valley, Professor Bowman's division of the expedition will travel north and east, down river, to the Sepahua or the Mishagua tributaries, ascend one of these, and cross over to the Alto Purus on the Madre de Dios. From a point a short distance east of the eastern border of the Andes a return will be made to Santa Ana and south along the 73rd meridian to the Pacific and eventually to Arequipa, the headquarters of the expedition. The main objects of the geologic and geographic work are: (1) a physiographic study of a belt of country extending from the Amazon basin to the Pacific across the Andine Cordillera; (2) a geologic reconnaissance, including studies of structure and the collection of fossils for the purpose of throwing light on the stratigraphy of this portion of Peru; (3) the effect of exposure, varying precipitation, and declivity upon the position of the snow line; (4) the limits and effects of Pleistocene glaciation; (5) soil and water supply studies in relation to vegetation; (6) a study of the artificial terraces or andenes and their relation to climatic change in the region; (7) anthropogeographic work in the various natural regions traversed, with special reference to the distribution of people. The return to New Haven will be made about December 18th. Mail may be addressed to Arequipa, in care of Grace & Co.

INDUSTRIAL AND PRODUCTIVE LIFE OF PERU. The June number of *Peru To-Day* is devoted to a review of the industrial and productive life of Peru. A great deal of information is presented in condensed form. Official records are supplemented from private sources and some hitherto unpublished statistics are given.

ASIA

MASSACRE OF EXPLORERS. The *Geographical Journal* (May, p. 571) announced the murder of Mr. Noel Williamson, Assistant Political Officer at Sadiya, who was recently killed (date not given) on the Assam-Tibet Borderland by the wild Abors of that region. They also massacred nearly all the members of his party, about 200 in number. Mr. Williamson had hoped to win the friendship of the Abors, and if possible, to trace the unknown course of the Brahmaputra (Dihong) River, which is the lower course of the Tibetan Tsanpo River. It is said that the Abors, while professing peaceable intentions, fell without warning on Mr. Williamson's party, which was practically annihilated.

The part of the Brahmaputra which Mr. Williamson desired to explore is that which Major L. Darwin in his last presidential address before the Royal Geographical Society referred to when he said that "the bend of the Brahmaputra is still drawn by guess work on our maps." About ninety miles of the river through this mountainous frontier region is still unknown because no white explorer or Indian traveler has been able to cross the region through which it passes. The Abor tribes for many years have kept all strangers from traversing their country.

The question of the sources of the Brahmaputra was therefore for many years a geographical conundrum. Native Indian explorers had traced the Tsanpo River in whose valley live most of the Tibetans, to within ninety miles of the known Brahmaputra. There they were stopped by the Abor mountaineers. Some geographers held the view that the Tsanpo was the upper part of the Brahmaputra, while others long affirmed that it was probably the source of the Irawadi River of Burma. It was not till 1886 that explorers conclusively proved that the Iriwadi had no connection with the Tsanpo. They showed that the headstreams of the Irawadi rise far east of the Tsanpo on the slopes of the Nankin Snow Mountains, and that high mountain ranges separate the basins of the two rivers. Some of the Indian explorers marked logs and set them afloat in the Tsanpo, thinking it probable that they would be picked up in the known part of the Brahmaputra. None of these logs seem to have been found in the lower river; but exploration to the east and west of the Abor country at last afforded sufficient evidence that the Tsanpo could be nothing else than the upper part of the Brahmaputra. The ninety mile gap in the river, however, still remains unexplored.

The British have twice sent punitive expeditions against these mountaineers, but the inhospitable tribes are still unconquered. The first white victims of the Abors are believed to have been Krick and Boury, who were killed in 1850.

THE ABSENCE OF RELIGIOUS CONCEPTIONS AMONG THE KUBUS OF SUMATRA. An interesting paper with this title by Prof. W. Volz of Breslau University is published in *Petermanns Mitteilungen* (Vol. 57, I, pp. 288-292). The paper deals with two problems: (1) Is it possible that a part of the Kubus tribe may, in consequence of its environment, have been preserved in its primitive state? (2) Is there a human being totally devoid of even the most rudimentary religious conceptions?

In the discussion of the first problem, Prof. Volz says that the Kubus are a primitive tribe inhabiting the central forest region of southern Sumatra between 2° and 3° S. They number roughly 8,000, but of these by far the greater part have been brought into contact with Malay civilization, and through its in-

fluence are in possession of rudimentary religious concepts. It is only with the small minority who remain in a primitive state that the paper deals. These primitive Kubus live in the interior forest of Sumatra, the central of the three longitudinal provinces into which the southern part of the island is divided. Adjoining it on the N.E. is a zone of mangrove swamps, extending as far as 35 miles inland from the coast. Belonging rather to the domain of the sea than to that of the land, offering food to practically no living creature—the mangrove region is not fit to be the habitation of man.

On the S.W. it gradually merges with the interior forest, which, in its turn, is bounded on the S.W. by the mountain ranges accompanying the western coast of Sumatra, which form the third natural province. Nor is the interior forest an inviting abode for man. For hundreds of square miles it extends in an unbroken, leafy canopy, through which even the birds do not penetrate. Of the Malays who have entered this region on the larger rivers, not a few have perished from want of food, although equipped with gun and ammunition. This, then, is the home of the Kubus. They are extremely few in number. Their life is one of such hardship that it is certain that they have never materially increased in numbers.

Given this environment, Prof. Volz argues that it is highly improbable that the Kubus have ever been affected by the early Malay invasions. Such an inhospitable region is not likely to have been the objective of former migrations. It is only since the advent of the European that the Malays are, by degrees, penetrating into this region under his direction, for the sake of its products, and gradually encompassing the scattered remnants of the tribe, with extinction the inevitable result. All the more reason for prompt action in the study of this primitive people before it is too late.

The state of development of the Kubu is a further argument in favor of the assertion that he has remained in the primitive state. His life is comparable to that of the gibbon, an anthropoid ape that inhabits the same forests as himself. His quest of food is the same. The Kubu is in the lowest stage of economic development, that of the gatherer. He lacks the impulse of the hunter, whose desire to overcome his prey is an important factor in the development of his mental faculties.

Finally, it stands to reason that the complete isolation of the Kubu has dwarfed his mental development. He has lacked the mental stimulus of contact with his fellow-men, be it of a peaceful or antagonistic nature. Prof. Volz feels that the evidence is conclusive that the Kubus who have not come into contact with the Malays have preserved their primitive state of development.

The second question, *viz.*, whether a total lack of religious conception is possible in man, Prof. Volz answers in the affirmative, basing his belief on various theoretical considerations, but more especially on his personal investigation of the Kubus.

W. L. G. J.

AUSTRALASIA AND OCEANIA

EXPLORATION OF NEW GUINEA. The exploration of New Guinea is advancing rapidly. Although several of the expeditions now in the field have suffered momentary reverses, the experience gained is a guarantee of their ultimate success. The expedition under Capt. Scheffer was forced to abandon its plan of crossing the island from south to north on account of the illness of its leader. It practically completed, however, the survey of the Eilanden River, which

empties into the Arafura Sea in $5^{\circ}50'$ S. lat., tracing it to its source in the central range at an elevation of about 11,500 ft., between Wilhelmina Peak and Juliana Peak, about 60 miles east of the former. In his attempt to reach Carstensz Peak in the central range by way of the Idenburg River, an eastern tributary of the upper Mamberamo, Dr. M. Moskowski inadvertently followed the western tributary, which had already been traveled, and reached the foot of the central range. Compelled to return because of lack of food, he had the misfortune to lose his ethnographic collections and the maps embodying the results of his surveys in a boat accident. Dr. W. Goodfellow, the ornithologist, whose objective was the same peak of the central range, was also forced to desist from his quest on account of illness. The Idenburg River, mentioned above, is being explored by an expedition under Lieut. de Wal, which started last May with a view to determining the feasibility of using this river as a line of attack in the attempt to cross the island from north to south. (*Pet. Mitt.*, 1911, I, pp. 305-306, based on various sources.)

ANTHROPOLOGICAL EXPEDITION TO NEW GUINEA. The University of Oxford is about to send out an anthropological expedition to New Guinea supported by grants from the Common University Fund and a number of the colleges, with contributions also from a few private friends of the expedition. *Nature* (June 15, 1911, p. 530) says that the Committee for Anthropology has selected Mr. D. Jenness of Balliol College to undertake the work of exploration. Mr. Jenness holds the Oxford diploma in Anthropology and has also had practical experience of the conditions of camp life in the bush. He expects to reach Papua in November and his base of operations will be Bwaidoga on Goodenough Island, one of the almost unknown D'Entrecasteaux Group off the south-east coast of New Guinea. He will probably begin his labors with a general survey of this Group, but as soon as he is thoroughly in touch with the natives he hopes to settle down to a detailed study of Goodenough Island in particular.

EUROPE

EXHIBIT OF PLANS OF ROME. An interesting exhibit of plans of Rome showing the development of the city since about 1500, forms a part of the Retrospective Exhibit displayed in the Castle of Saint Angelo in connection with the International Exposition now being held in the Italian capital. The most important piece in the collection is one of three originals of the manuscript *Pianta di Roma*, drawn by Leonardo Bufalini in 1551. The value of Bufalini's work lies in the fact that his map of Rome represents relief. In the avoidance of the practice, so common to medieval cartographers, of superimposing on the ground-plan, perspective views of prominent buildings, Bufalini is also far in advance of his contemporaries. The following two centuries were a period of retrogression, rather than of advance, as shown by the maps in the collection. A return to Bufalini's methods inaugurates a new era of development marked by the publication, in 1748, of Nolli's map, on which ground-plan and relief are combined. The subsequent maps covering the period up to 1870 do not essentially differ from it in treatment; they show, however, the improvement in methods of reproduction. Some of the newer maps, however, are less satisfactory than the older ones in their representation of relief, a condition brought about by the growth of the built-up areas of the city, which renders it more difficult to effect a satisfactory compromise between the representation

of streets and of topography. This is unfortunate, as with regard to few cities does the topography play so important a part as in the case of the City of the Seven Hills. (*Pet. Mitt.*, 1911, I, pp. 310-311.)

THE LÖTSCHBERG TUNNEL. The new route through the Alps by way of the Lötschberg tunnel will not shorten the routes to Rome from Paris and Germany, but will considerably decrease the mileage from London and Northeastern France. It will be two years yet before trains will be crossing the Bernese Oberland. The nine-mile tunnel is largely the enterprise of Bern. Ever since the completion of the Simplon tunnel in 1905 the business men of the federal capital have felt that other cities of Switzerland were getting most of the local benefit from the roads through the St. Gotthard and Simplon tunnels that connect the rail routes of Italy and north Europe. The St. Gotthard tunnel serves traffic to and from Lucerne, Zurich and Basel and the Simplon is directly connected with Geneva. But Bern, between the two, was isolated from both.

After studying the question of a feasible route that would bring through trains to Bern, it was decided to utilize the railroad extending from Spiez on Lake Thun to Frutigen. It was found that the railroad could be extended from that point without much difficulty up the Kander Valley to Kandersteg. Here began tunneling which took four years and five months. The rest is comparatively easy work, laying the track down the Lötschenthal to the Rhone and up that river to connect with the Simplon tunnel at Brieg. The Lötschberg tunnel is a little shorter than the St. Gotthard, and three miles shorter than the Simplon.

UPPER LIMITS OF FOREST TREES IN SCANDINAVIA. Mr. C. Rabot of *La Géographie* summarizes in that journal for April his own work and that of others relating to the upper limits of forest trees in Scandinavia. He comes to the conclusion that the retreat of these upper limits is to be attributed to a lowering of the summer temperature, which has been estimated at 4.5° F.

POPULATION OF BULGARIA. The population of Bulgaria on Dec. 31, 1910, was 4,329,108, an increase of 7¼ per cent. in five years. The area of the country being 37,200 square miles, the number of inhabitants to the square mile is 116. North Bulgaria had a population of 2,373,649 and a density of 124, South Bulgaria of 1,955,459 and 109, respectively. (*Pet. Mitt.*, Vol. 57, I, p. 302.)

POPULATION OF DENMARK. On Feb. 1, 1911, the population of Denmark was 2,757,076, an increase of 6½ per cent. in five years. Its area being 15,042 square miles, the density of population was 184. With the addition of the Faroe Islands the figures for the entire kingdom are 2,775,076, 15,582 square miles and 179, respectively. The population of Copenhagen, inclusive of Frederiksborg was 559,398, an increase of 8.8 per cent. in five years. The next city in size was Aarhus, with 61,755 inhabitants. Thirteen other cities of Denmark had a population greater than 10,000. (*Pet. Mitt.*, Vol. 57, I, p. 302.)

POLAR

CENSUS OF DANISH GREENLAND. The census of Dec. 31, 1909, shows that the native population of West Greenland is slowly increasing. In 1909 there were 4.4 births and 3.4 deaths among each 100 inhabitants. The population was 12,414, or 94 more than in 1908. The station of Angmagssalik on the east coast in 1909 numbered 554 natives, or nine more than in the preceding year. These facts

are interesting inasmuch as the Eskimo race appears to be decreasing in many parts of its habitat, while under the Danish administration in Greenland the number is augmenting.

AMUNDSEN'S BASE OF OPERATIONS. A letter from Capt. Roald Amundsen dated Feb. 9, 1911, was brought north by the exploring vessel *Fram* and is published in the *London Times* (Weekly Edition, June 9, 1911). He gives the reasons why he made his headquarters on the Barrier Ice a little to the west of Edward VII Land at the point along this remarkable ice wall where Captain James Clark Ross in 1842 observed a large indentation or bay in the wall. In 1900, Borchgrevink, the Norwegian explorer, entered this small bay and thence climbed up to the Barrier Ice surface, which he found stretching southward as a wide, level plain as far as the eye could see. Later this bay was seen by Capt. Scott; and Sir Ernest Shackleton entered it in the course of his expedition of 1908, and named it Bay of Whales. Because this bay had been observed at intervals for over sixty years, Amundsen decided that it must be an enduring formation and would afford a safe harbor in which to unload his expedition.

The day after he sighted the Barrier he reached this bay, which is in about 164° W. Long. His theory of the origin of the bay is that the sea shoals where the bay exists and the mighty glacier was thus forced out on either side, forming thus a great indentation in the ice wall.

The *Fram* was safely moored to the ice in the bay, and on Jan. 16, 1911, the party began to unload the cargo. The house was erected on top of the Barrier Ice, 150 feet above the surface of the bay. The Greenland dogs, 115 in number, picked for their hauling qualities, slowly pulled the heavy laden sledges up to the site. The solidly built house stands safe and secure, sunk four feet down in the snow as hard as rock and supported by back stays on all sides. Amundsen named it "Framheim" and it stands in about 164° W. Long., 78°40' S. Lat. It is the most southerly habitation yet built in the Antarctic. Fifteen tents were set up around the house for the use of the dogs and as storerooms for food supply, coal, wood, clothing, etc. The food depot contains provisions sufficient for two years. Up to the time the *Fram* left, the party had lived almost entirely on seal meat, which Amundsen writes he would not exchange for any other dish in the world. Seals were found in large numbers and he expected soon to secure an adequate winter supply for his party and the dogs.

"It is my intention," he wrote, "to lay down a main depot in 80° S. Lat., and a smaller one as far south as possible; and I hope that, with the excellent means at our disposal, we shall get to 83° with the smaller depot in the Autumn, before the dark season sets in. I can say nothing more with regard to our future prospects. We shall do what we can."

It thus appears that Amundsen has pitched his headquarters not on land, but on the Barrier Ice itself; that his base station is somewhat nearer the Pole than that of any previous explorer; and that if he succeeds in planting a food depot at 83° S., he will establish food supplies farther south than other explorers have been able to do on their journeys preparatory for their main advance.

ANTARCTIC EXPEDITIONS. The *Geographical Journal* (July, 1911) announces that Mr. Pedro Christofferson, a Norwegian living in Buenos Aires, has offered to bear all the expenses of Capt. Amundsen's *Fram* for provisions and other outfit during the ship's work in the Antarctic, and until the final arrival in San Francisco.

Dr. Mawson, the leader of the projected Australian Expedition, has acquired

a suitable vessel—*Aurora*, built at Dundee in 1876—and the necessary preparations are going forward under the superintendence of Capt. Davis. The equipment will include an aeroplane.

AN EXPEDITION GOING TO CROCKER LAND. While Peary was engaged during a part of 1906 in completing the coast survey of northwestern Grant Land, he saw to the Northwest a region which he named Crocker Land and which is the most northern land yet known to exist on the globe. We learn from the American Museum of Natural History that an expedition has been organized for the scientific exploration of Crocker Land. It will be led by Prof. D. B. Macmillan and Mr. George Borup, who were members of Peary's North Pole party in 1909. It is hoped that Peary's ship, the *Roosevelt*, will be acquired for the expedition, which is expected to cost about \$25,000. It is hoped to start north in June next year and, if possible, work the ship north and west to Cape Columbia, which will be the advance base from which the journey to Crocker Land will be made by sledge. The expedition hopes to do a large amount of important work in the locality mentioned, and expects to be away from home about three years. It is said that several scientific bodies and private individuals are contributing financial support. Capt. R. Bartlett is making a trip to Etah this summer to arrange for the men, dogs and food which will be taken on board the exploring vessel in the summer of 1912.

PHYSICAL GEOGRAPHY

SEA WEED IN THE SARGASSO SEA. Dr. John J. Stevenson, who recently sailed across the Sargasso Sea, reports his observations briefly in *Science* (Dec. 9, 1910). He says that the "indefinite descriptions of the area and mass of seaweed, as well as the extraordinary statements made by some authors in discussing the origin of coal, induced the writer to make an examination of the conditions for himself. The matter is easy, because the steamship route between Barbadoes and the Azores crosses the area diagonally and passes very near the center. His own observations, and the information gained from officers who had crossed the Sargasso Sea many times, lead him to think that "much depends on the time of year, for weed appears to accumulate while the Trades are mild and to be broken up later in the season when the strength of the winds increases. In any case, however, the weed occupies only a small part of the area, the patches being separated by wide spaces of clear water, almost free from weed. Many of the bunches show unmistakably that they had been attached to rock; and the plants have traveled far, since in a large proportion of bunches only a part is living, the dead parts being of a brownish color. In passing through the Bahamas the seaweed is found to be "much more abundant than along either of the lines followed across the Sargasso. The weed is evidently the same, being in circular bunches up to 18 inches diameter arranged in strips according to the direction of the wind, though occasionally in bands or even in patches eight by ten feet. The patches are near the large islands.

"At best, the quantity of weed seen at any locality is wholly insignificant. Midway in the Sargasso Sea, the bunches seen in a width of a mile would form, if brought into contact, a strip not more than 65 feet wide. This, where the weed is most abundant. But the bunches are very loose, the plant material, as was estimated, occupying less than one-fifth of the space and if the bunches were brought together so that the plant parts would be in contact, each square mile would yield a strip not more than 13 feet wide and 3 or 4 inches thick,

or barely 2,500 cubic yards to the square mile. . . . The accumulation of decayed vegetable material from seaweeds must be comparatively unimportant under the Sargasso sea; and what there is would be merely foreign matter in mineral deposits."

PERSONAL

Prof. W. M. Davis sailed from New York on July 22 for Queenstown to begin in Ireland the summer field work in physiography, the plans for which were described in the August *Bulletin*. Prof. Mark Jefferson expects to join Prof. Davis's party early in August.

Dr. H. C. Cowles of the Department of Botany, University of Chicago, sailed in June to spend six months in Europe. He will take part in an excursion of plant geographers in England, spend some time in France and Switzerland, and be present at the meeting of the Tenth International Geographical Congress at Rome in October.

Dr. Sven Hedin has been elected a member of the Paris Academy of Sciences.

GENERAL

NEW EDITION OF THE CENTURY ATLAS. The Century Co., New York, announces that a new edition of the Century Atlas will be published in the autumn. This atlas, which forms a part of the Century Dictionary and Cyclopedia, is particularly valuable because of its large-scale maps of the several States and of the Provinces of Canada. Of these regions it can be said to afford the best cartographic presentation among general atlases published by private firms. The following is an extract from the preface to the new edition:

"In the new edition several of the maps, particularly that of Alaska and the different maps of Canada, have been entirely remade, and all the others have been thoroughly revised; the railroads have been brought down to date; incorporated places not included in previous editions of the atlas have been added; the index has been reset and includes the results of the United States census of 1910, and entirely new maps of the South Polar region, of Oklahoma, and of the interurban trolley connections in the north central States, and the northeastern States have been added."

ARIDITY, SALT DEPOSITS AND CURRENCY. The use of blocks of rock salt for building purposes or as currency, in regions of great aridity, is one of the most obvious illustrations of climatic control over human customs. In a recent description of the salt plain which lies to the east of the Abyssinian tableland, Major A. Tancredi (*Boll. Soc. Geogr. Ital.*, Feb., 1911) brings out some striking facts regarding the climate of that district. The plain lies somewhat over 100 meters below sea-level, and forms an area of inland drainage. The mean temperature is about 88° Fahr., and the summer maxima are said to reach 122° Fahr. The salt deposits of the region furnish blocks of rock salt which are used throughout the country as currency by the Abyssinian merchants. These blocks rise rapidly in value towards the more remote western parts of the tableland.

R. DEC. WARD.

PHOTOGRAPHS DESIRED BY THE U. S. WEATHER BUREAU. This Bureau is forming, in its library at Washington, a collection of meteorological photographs and will welcome additions thereto from all parts of the world. It would like photographs of observatories, apparatus, meteorologists, clouds, rainbows, lightning and its effects, etc.

GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY)

BOOK REVIEWS AND NOTICES

(The size of books is given in inches to the nearest half inch.)

NORTH AMERICA

Maryland Weather Service. Vol. 3. Pp. 533. Pls. XXXIX. Figs. 15.
The Johns Hopkins Press, Baltimore, 1910.

The Maryland Weather Service has set a standard of climatological work in the United States which does the State of Maryland, and all those who have been active in these investigations, the highest credit. In 1899 there appeared Vol. I, a splendid report of more than 550 pages, fully illustrated, containing "A General Report on the Physiography of Maryland," by Cleveland Abbe, Jr., and a "Report on the Meteorology of Maryland," by Professor Cleveland Abbe, Sr., E. J. Walz and Dr. O. L. Fassig—a volume which the present reviewer then characterized as "bahnbrechend." In 1907 came the second volume, of over 500 pages, containing a discussion of the climate and weather of Baltimore, by Dr. O. L. Fassig, so complete that it ranks with European climatological investigations, and has done much to relieve the unpleasant, but wholly deserved criticism which has so often been made against American meteorology by our European colleagues.

Now we have the third volume, which we welcome as a fitting companion to the other two. The present volume is a fine example of what the reviewer has often termed *economic climatology*. It shows clearly how important is a knowledge of the broader outlines of climatology in any investigation of plant life. Following the first two volumes in logical order of succession, we have in the third volume the application of the principles laid down in the other two. The fullest, the most effective, the highest use of climatological data is to be found, not in the mere tabulation and summarizing of these data, but in the study of the relation of the atmospheric conditions, which these data show to prevail, to man, to his industries, his use of the soil, his health, his general development. To many, probably, the admirable studies of "The Plant Life of Maryland," by Messrs. Forrest Shreve, M. A. Chrysler, Frederick H. Blodgett and F. W. Besley, which are included in this volume, will seem somewhat out of place under the title of Maryland Weather Service. But to us it seems that Professor William B. Clark and his associates have done a piece of work in economic climatology which as logically belongs among the investigations of a meteorological service as does a detailed study of the temperature, the rainfall, or the winds. We are glad to note, in the Preface, the statement: "Other lines of work suggested or inaugurated include a more detailed study of the swamp lands which are so intimately connected with the climatic conditions of the State that their study, in part at least, falls within the province of the State Weather

Service. The far-reaching influence of climate on the economic and social development of communities suggests investigations upon the relation of agricultural soils to physiographic and climatic features, and the bearing of climate upon health."

The volume contains an introduction, which is a summary of the climatic factors upon which plant growth depends; upon the topography of the State and its relation to vegetation and upon the mineralogy and soils of Maryland and their bearing upon plant growth. The titles of the chapters, *e. g.*, "Floristic Plant Geography of Maryland," "Ecological Plant Geography of Maryland," "The Relation of Natural Vegetation to Crop Possibilities," "Agricultural Features of Maryland" and "The Forests and their Products," show clearly the scope of the investigations and their practical bearings. As a whole, the third volume of the Maryland Weather Service is fully up to the standard of the two preceding volumes.

R. DEC. WARD.

SOUTH AMERICA

Across South America. An Account of a Journey from Buenos Aires to Lima by Way of Potosí. With notes on Brazil, Argentina, Bolivia, Chile, and Peru. By Hiram Bingham. xvi and 405 pp., maps, illustrations and index. Houghton Mifflin Company, Boston and New York, 1911. \$3.50. 8½ x 5½.

The best part of this book, less than half its bulk, deals with Dr. Bingham's ride along the old trade route between Buenos Aires and Lima, from Quiaica to Oruro in southern Bolivia, and from Cuzco to Huancayo in Peru. His zeal for Spanish American history led him into many a weary day and night of dreary discomfort. Geography is not his topic, so we hardly find an attempt at adequate description of land or people. Apart from details of travel, his attention is directed to campaigns and routes of trade mainly. Yet we gather a distinct impression for the route traversed of fertile, sheltered valleys, sunk thousands of feet beneath bleak, rolling desert *paramos*, of a wretched people barely existing in a land that is poor and populated to the full, more densely than ever before. It is good to get this view, for Peru has been overpraised. But probably this view too might be overdone. There are great disadvantages under which people live in the Andine valleys, but some of them are not hopeless of improvement. Incidentally, the pains of Peruvian and Bolivian travel should inspire a certain respect for the disparaged peoples who undertake it uncomplainingly.

Two route plans well illustrate the itinerary, but the printer has interchanged them and put each in the wrong context (pp. 80 and 280). They show no topography. The pictures are good geographically, but uneven. Especially fine is the Uspallata Pass. The reader will feel the author's discomfort on the old overland trail.

Interwoven with this narrative are *impressions de voyage* along the author's way to the pan-American scientific congress at Santiago, Chile. The east coast of Brazil, the Argentine and Chile are made to fill 200 pages, with notes on somewhat familiar regions.

Dr. Bingham has little sympathy with the native Spanish Americans. The reviewer feels that they have many admirable qualities, less readily perceived by the casual visitor than their differences from us. Why should their willingness to wait till eleven for breakfast be disparaged? They are quite as early risers as we. As for their contention that they are *Americans*, while we are

North Americans, it is no more unreasonable than our attitude. It is simply the custom of speech in South America, in Spain and in Italy as in parts of France. With us and in Northern Europe another habit prevails. There is something in the old rule. "When in Turkey do as the Turks."

MARK JEFFERSON.

Das Flussgebiet der Ribeira de Iguape im Süden des Staates S. Paulo (Brasilien). By Gustav Stutzer. 120 pp., 18 maps and illustrations. W. Süsserott, Berlin, 1910.

The author of this monograph knows his subject intimately and gives in unpretentious form a great deal of useful information with respect to nearly the entire district in the southern part of the Brazilian state of São Paulo on the Ribeira and its affluents. Topography, climate, flora, fauna, minerals, population, means of communication, etc., are all discussed fully enough to create a presumption in favor of Herr Stutzer's main contention, namely, that Central and North European agricultural laborers and peasants have comparatively little reason to fear the "hazard of new fortunes" in this region, which (although its mineral resources have often been absurdly overestimated) undoubtedly possesses exceptionally rich soils and navigable waterways that facilitate transportation. The climate is overpraised.

M. W.

Uruguay. By W. H. Koebel. 350 pp., map, illustrations, appendix and index. Charles Scribner's Sons, New York, 1911. 9 x 6.

Koebel's various writings on Latin-America are recognized as carefully prepared and of authoritative value. The present volume may be welcomed as one of the best collations of well-arranged facts we have in English concerning Uruguay. A third of the volume is given to the history of the country. Then follow chapters on Uruguayan manners and customs, the aboriginal tribes, the geography of the Republic, Montevideo and other cities, the Uruguay River, the Campo, Estancia life, Uruguay as a pastoral country, her political divisions, climate and natural history, her industries and natural wealth, communications and commerce. In the appendix are many statistical tables and a good index makes all information readily available. The map is helpful, though it gives no idea of the topography of the country.

AFRICA

Sur les hauteurs du Katanga du lac Moero à Lukafu. Par le Commandant Jules Morisseau. Itinéraire du Prince Albert de Belgique. 85 pp., and illustrations. Imprimerie scientifique, Charles Bulens, Brussels, 1910. Fr. 1.

A brief, sketchy account of the author's journey from Kilwa on Lake Moero southwest to Lukafu in the province of Katanga. It describes the route afterwards traversed by the present King of Belgium several years ago. A chapter on the pacification of this most southeastern province of the Belgian Congo, is included. A considerable number of photo-engravings show aspects of the country.

La Conquête du Sahara. Essai de psychologie politique. By E. F. Gautier. 260 pp. Armand Colin, Paris, 1910. Fr. 3.50.

A book by Mr. Gautier on Saharan problems is always interesting, either politically or geographically, or in both ways. So it is in the case of this book. In the first two chapters the author tells us his version of the conquest of the

Tuareg Sahara by France, which is based on much new evidence collected on his travels, and which destroys several legends that had developed about the events of the early eighties. The bit of humor with which he seasons his argument makes it so much pleasanter reading. The third chapter is devoted to the "méharistes," *e. g.*, the cavalry of natives riding on the "méhari," or Africa dromedary. The entrance of the méhari into the service of the French marks the turning point in the struggle of France for the subjection of the desert. After many fruitless attempts by European riders to use that animal for military purposes, the problem was finally solved by enlisting members of the Chaamba, an Arabian tribe from the country to the south of Wargla, as their riders. A variety of circumstances combined to make the Chaamba the right material for this experiment. They had long been under French government, nominally since 1854, and the French had also acquired a certain authority with them by the fact that they had discovered artesian wells in their country. This proved a useful lesson on the advantages that might accrue to them through the contact with European civilization, and while among the older people distrust has not yet quite disappeared, the younger generation has, slowly but steadily, felt the taming influence of the changed conditions, and they have become friends of the French. In that character the Chaamba have acquired a certain prestige among their fellow tribes, because what had formerly been the Tuareg Sahara is now the Chaamba Sahara, owing to the fact that the profession of policemen proved to them more attractive than that of banditti.

By limiting their drill to the indispensable minimum of military discipline, and interfering with their habits and wants as little as possible, their organization has been made efficient to a degree never reached in modern colonial history. They are loyal to their service, which is not felt as a burden by them, and by their intimate acquaintance with the ways of the méhari they get as much out of the animals as the nomadic natives do, and this means everything, of course, in a country where, with French riders, these animals had been sacrificed by the thousands on fruitless expeditions through the desert.

If the Chaamba are the most useful inhabitants of that country, the Tuareg are certainly the most interesting from the ethnographical point of view, and must be assigned a place by themselves among their fellow tribes. It is almost certain that they were originally a white race which received an admixture of negro blood after settling on African soil. There is much in their manners and customs that challenges comparison with those of Europe and although Mohammedans by name, they do not speak Arabic. It is not impossible that they are descendants of the Moors, the conquerors of Spain, who, in the seclusion of their desert home, were not reached by the changes which their Moroccan cousins have since experienced. The name even of Tuareg seems to be a corruption of an old Berber word; an alphabet which was used for epitaphs by the old Berber peoples, and which is not known in modern Barbary, is still in use among the Tuareg, and for the sole purpose of making inscriptions on rocks, too.

Besides these traces of ancient Berberian relations, they have preserved other relics of the past which even antedate these. Their social system is distinctly matriarchal; they observe a number of taboos of decidedly pre-islamitic origin, and their axes, although made of iron, are exact counterparts of neolithic ones, *viz.*, the iron terminates in a heel which is fastened, by means of a thong, in an opening of the wooden handle.

Their isolation in the center of the desert resembles that of those South Sea Islanders among whom similar reminiscences of prehistoric ages have been preserved. But the Tuareg are the only example of a white population living as nearly as this under neolithic conditions; they are the men of Cro-magnon stepped forth from their cavern.

The archaism of their institutions forms a striking contrast with their high intellectual qualities. They have especially a highly developed geographical instinct. They answer geographical questions willingly and clearly, and illustrate their answers by drawing diagrams in the sand, so that they have often acted as competent guides to the explorers of their country. In Bissuel's book on the Adrar-Ahnet Mts., for instance, large parts were written from the dictation of a Tuareg captive in Algiers, and the map which accompanies that book is the reproduction of a relief map made by that same Tuareg during his captivity. This map was the only foundation, from 1885 to 1905 for the cartography of that country; even now, with our increased knowledge of the latter, it is, although imperfect, tolerably correct, and considering the circumstances under which it was made, it must be called marvelously good. The knowledge of the Tuareg, too, of the oases and watering places is so extensive and accurate that without the information obtained from them the exploration of the Sahara might even to-day be more imperfect, and include greater risks, than that of the Polar countries. To win that intelligent tribe for the service of the French would be a great step toward the civilization of the desert.

Of the Trans-Saharan Railroad, too, the author says a few words. Without feeling as enthusiastic over the project as some of his literary colleagues do, he is perfectly convinced, not only that such a road is possible, but also that the national as well as international advantages to be derived from it would be large enough to justify its construction.

M. K. GENTHE.

Kamerun als Kolonie und Missionsfeld. Von P. Steiner. Verlag der Basler Missionsbuchhandlung. Basel, 1909.

The little volume is only of missionary interest. It tells the history of the work of the different protestant missions in that country, especially of the Basel mission. The geographical part is not original, and the map places the missionary stations so much in the foreground that it has little value for general purposes. The index contains a list of literature on Cameroon, which, though not complete, has several references which may not be generally known.

M. K. GENTHE.

ASIA

An Illustrated Guide to the Federated Malay States. Editor, Cuthbert Woodville Harrison, Malay Civil Service. 333 pp., map in pocket, illustrations and appendices. The Malay States Development Agency, London, 1911. 2s. 6d. $6\frac{1}{2} \times 4\frac{1}{2}$.

This excellent little book describes the Malay Peninsula from north to south, from Penang to Singapore. The region seems to open an attractive new field to the globe trotter. The book says there is no unrest in Malaya. The country is quiet, the people content, and the town streets and country roads are perfectly safe. The people who are now called the aborigines, that is, the Negrito and Semi-Negrito wild tribes who inhabit the jungles, are the first inhabitants of the peninsula known to its history. But there existed before the Negrito, the pre-

historic men, of whom traces are found all over the world. Their stone implements may be seen in the Museum at Taiping. The peninsula itself is a curious historical museum, showing every grade of primitive culture, and here and there are monuments and inscriptions that were in existence before the Malays came in the Fifteenth century.

The book contains a large amount of authoritative information about the Federated Malay States, as well as ample guidance for the tourist. All important towns are described, motor trips are outlined, the opportunities for big game shooting are noted, the contents of museums outlined, and also the attractions of boat journeys on the Perak River, the native theatres, etc. Much attention is given to tin-mining, Para rubber planting and other industries. The illustrations, which include very pleasing colored views, and the map are excellent.

Letters from China. With Particular Reference to the Empress Dowager and the Women of China. By Sarah Pike Conger. xv and 392 pp., 80 illustrations, map and index. A. C. McClurg & Co., Chicago, 1909. \$2.75. $8\frac{1}{2} \times 5\frac{1}{2}$.

Mrs. Conger, the wife of our former Minister to China, lived seven years in that Empire, during which she had many opportunities to gain clear ideas of the country and of the real character of the Chinese. Her book is composed of many of the letters she wrote to her relatives at home, and she arranged them for publication in the belief that they would help to correct widespread and erroneous views concerning China and the Chinese. Few books have been written that give so intimate a picture of the many things she describes, and her position opened for her the doors to many aspects of the land and people that are not seen by most travelers. The book has a valuable place among works on China in the English language.

Strange Siberia Along the Trans-Siberian Railway. A Journey from the Great Wall of China to the Skyscrapers of Manhattan. By Marcus Lorenzo Taft. 260 pp., illustrations and index. Eaton & Mains, New York, 1911. \$1. $7 \times 4\frac{1}{2}$.

A small book, with more meat than is found in many books of travel four times as large; nor does interest flag on any page. Its descriptions are clear, it gives the real atmosphere of town, farm, steppe and mountain, and shows the influences that are shaping men and things in the Russian Empire. The chapters on "Irkutsk" (population about 100,000), "The Jews in Russia" and "The Steppes" are especially noteworthy. It has a good index and is worth it.

The Nāga Tribes of Manipur. By T. C. Hodson. xiii and 212 pp., map, 17 illustrations, appendices and index. Macmillan and Co., Ltd., London, 1911. \$3. $8\frac{1}{2} \times 5\frac{1}{2}$.

These tribes live by agriculture in the hill country which forms the larger part of Manipur in eastern Assam adjoining Burma. Each tribe has a definite place in the family of Tibeto-Burman languages and in their area is a rich variety of dialects, due to the confluence of at least two streams of language. The tribes do not intermarry, and thus variety in customs as well as in dialects is encouraged. But all are headhunters; and the author is careful not to lose sight of the essential unities that underly the diversities among these peoples. He collected his material ten years ago with great care and thoroughness, and

his book is a well-arranged and detailed study of these little-known tribes in relation to their geographical distribution, domestic life, laws, customs and religion. The volume concludes with specimens of their folklore. Most of the many authorities he quotes deal with anthropological and ethnological topics in general, and not with his special field of study; but all his citations from these works have direct relation to phases of the tribes he is describing.

Le Sultan, L'Islam et les Puissances. Constantinople—La Mècque—Bagdad. Par Victor Bérard. Avec deux cartes hors texte, iii and 443 pp. Librairie Armand Colin, Paris, 1907. F. 4.

This book, written a short time before the removal of Abdul Hamid from the sultanate, throws many interesting sidelights on the political situation preceding that event. In the first part the author discusses the difference between the Arab and Turkish parts of the Ottoman empire. The two races are separated by the Taurus Mountains, so that the realm of the Turks comprises Asia Minor, and that of the Arabs extends on the other side of that range to the Gulf of Persia and the Sinai Mts., and farther through the Arabian peninsula to the Indian Ocean. Although the country is ruled by the Ottoman government, and inhabited by Christians, as well as Mohammedans of all denominations, the Arabian element dominates, and Arabic is the common language of the people.

Between these two parts of the empire extends the "step" (*-thagr*), a border region inhabited by nomads and brigands: Armenians, Turkomans, Tcherkesses, Kurds and others, which prevents any intimate relation between the two sides.

This large Arabian part of the empire has never been quite reconciled to the Turkish government, and in one place or the other it has always been in a condition of latent or open rebellion. Former sultans were content to govern Asia in the Turkish way as long as their armies secured the throne, the cities and the highways, and they left the open country more or less to itself. The effect was that, whenever lack of money affected the readiness of the army, there was, all over the Arabian country, a sudden springing up of liberators, prophets and brigands, who menaced the unity of the empire.

Abdul Hamid II was the first to use a different policy. Without underestimating the power of the army, he tried at the same time to satisfy and please his Arab subjects. This fact explains many of his acts, which otherwise would appear not only criminal, but most unwise. In his public and private life, his foreign and domestic policy, there is, perhaps, not one of his acts but was intended to win the confidence of the Arabs—but at the same time contributed to endanger the future of the Turks and Turkey. To be sure, he had dangerous chiefs imprisoned and even poisoned on the slightest suspicion; but on the other hand, he chose Arabs for his advisers and secretaries, established an Arabian bodyguard beside the Turkish one, and although his official ministers and counselors were Turks, the real power behind the throne was in the hands of a camarilla of Arabs, who knew exactly how to rule him by taking advantage of his foibles. The result was that the Turks, grieved at this state of things, found a friend in England that had long been nervous on account of the growing influence of Germany at the Yildiz Kiosk. She was only too willing to act as the advocate of the oppressed, especially because there were not only the Turks, but also the Christians, who had to suffer from these Arabian influences. Thus, with the Sultan, the Arabs and the Kaiser on one side, and the Turks, Christians

and the Foreign Office on the other, the author almost foretells the course of events which afterwards justified his forecast.

On the occasion of the twenty-fifth anniversary of his accession to the throne, Abdul Hamid II promised the believers, among other things, the building of a telegraph and railroad line to Mecca in order to spare the pilgrims the necessity of using the boats of the Giaurs. This project had, however, a very worldly side, because from the oldest times, and long before Mohammed, Mecca had been the crossing of the two great roads that control traffic on the Arabian peninsula, a north-south one between Syria and Yemen, and a west-east one from the Red Sea to the Gulf of Persia. With the Red Sea in the hands of the English, the construction of an overland route through that country under Turkish control was a national and political, as well as religious, enterprise.

Considering the close relations between Arabia and Africa on one hand, and the extension of that railroad into Syria on the other, it is evident that that road would, when completed, control the nearer East from Asia Minor to Abyssinia. It is with some apprehension, therefore, that the author, as a Frenchman, watches the progress of Germany in Syria and Palestine and the sale by England of the Syrian railroad concessions to a German syndicate, so that Germany might eventually control nearer Asia, from the Mediterranean to the Red Sea and, in coöperation with Turkey, also the land route to India. He already sees Barbarossa resuscitated to complete his conquest of the Holy Land.

With all these forces at play, the value of that railroad for those in whose interest it was claimed to be constructed seems somewhat problematical and, by way of the Turco-German "tyranny" and the Syrio-English agitation, it may benefit in the end,—like so many enterprises, and especially railroads, in the Turkish empire—nobody but the French or German companies who will install themselves on the ground that has been prepared by others.

The story of the Bagdad railroad is very much like that of the Pilgrim road. It had, too, long been planned by England and Turkey combined, but, in the exultation over the building of the Suez Canal, England lost view of it and Germany promptly stepped in. If the jealousies and apprehensions of one's competitors are a gauge of success, German readers of that book may feel safe about the prospects of their railroads in the Near East, and while the author's opinions on that subject may not be entirely unbiased, the book remains nevertheless a scientific and up-to-date study of the situation on that much coveted territory, and in spite of its more political character it does not neglect the geographical side of the subject.

M. K. GENTHE.

Outlines of Agriculture in Japan. iv and 132 pp., map and illustrations.

Published by the Agricultural Bureau, Department of Agriculture and Commerce, Tokyo, 1910. 9 x 6.

The work was compiled to acquaint foreigners with the general outlines of the agriculture of Japan. The two features that characterize Japanese farming are (1) that the cultivation of rice has the leading position, the value of the rice crop being equal to that of all the other agricultural industries; and (2) that farms are very small and farming is intensive. Seventy per cent. of the farmers till only 2.45 acres or less. All the farmers who cultivate more than 7.35 acres of land each do not exceed three per cent. of the total number of agriculturists. The result of the enormous population and of the small area of the fields is that methods of cultivation are necessarily intensive and crops are generally

raised twice a year from the same farm. Many younger nations are now giving much attention to the maintenance of the fertility of the soil. They may well study the methods of Japan, whose soil has for ages been forced to produce enormous quantities of food and is still kept in the highest state of fertility. The book tells how every particle of fertilizer produced at home is utilized in the field, even to weeds, the ashes of plants, and the sweepings of the streets, in addition to the large quantity of commercial fertilizers imported from abroad. The work discusses all phases of Japanese agriculture and is a very useful contribution to our knowledge of the greatest activity of the Japanese people.

Mining in Japan. Past and Present. Published by The Bureau of Mines, The Department of Agriculture and Commerce of Japan. 1909. v and 322 pp., and maps. 10 x 6½.

This work was especially prepared to give information regarding the past history and the present condition of mining in Japan. Its maps show the distribution of the metals and the coal and oil fields of the empire, and the text, treating each mining industry separately, describes its history and development with more detailed information as to the most important mines and oil fields.

EUROPE

Early Britain. Roman Britain. By Edward Conybeare. 275 pp., map and index. Society for Promoting Christian Knowledge, London, 1911. 3s. 6d. 6½ x 4½.

A trustworthy and readable sketch of the historical growth and decay of Roman influence in Britain, illustrated by the archæology of the period. Seventy-seven ancient authors are referred to, and all of the best modern authorities were consulted. The book gives 123 pages to pre-Roman Britain, 36 to the Roman conquest, 64 to the Roman occupation and 51 to the end of Roman Britain. A chronological table and list of authorities are included.

British Mountain Climbs. By George D. Abraham. xvi and 448 pp., illustrations and index. Mills & Boon, Ltd., London, 1909. 7 x 4½.

A handy book for the pocket and a conveniently small and concise guide to the British rock-climbs, the result for the most part of the author's personal experience. British mountain climbers find much recreation and enjoyment among the higher elevations of Wales and Scotland, and not a few of the climbs described in this book require roping if the climbers take sensible precautions against accident. The author groups these British climbs around the most convenient centers and mentions the most helpful maps at the beginning of his leading chapters.

Swiss Mountain Climbs. By George D. Abraham. xv and 432 pp., illustrations and index. Mills & Boon, Ltd., London W., 1911. 7s. 6d. 7 x 4½.

A work that all Alpinists will appreciate. It is full of suggestions with regard to the most popular and important climbs among the Alps. Sketch maps show the best routes to many summits. The book includes a considerable number of climbs of no great difficulty and seems to encourage even those who are in no sense mountaineers to attempt some of them. The author says:

"Few Englishmen, aye, and even women if they be sound of wind and limb, but can tackle an average Alpine ascent. Good strong trustworthy guides are

available, and these stalwarts are capable of looking after matters of equipment and taking their patrons anywhere in reason. They are becoming past-masters in tactful discrimination, they 'temper the wind to the shorn lamb'".

In the Abruzzi. By Anne Macdonell: With Twelve Illustrations after Water-Colour Drawings by Amy Atkinson. ix and 309 pp., map and index. F. A. Stokes Company, New York, 1909. \$2. 8½ x 5½.

The land of the Abruzzi is due east of Rome, beyond the nearer heights that bound the Campagna. This region is supplied with railroads and other highways, but travelers, and even most Italians know little of it. Only recently have the Abruzzi come to be visited by tourists, though the region is wonderfully picturesque and contains also the relics of great art, though they must be sought for because they are not gathered into collections, but are scattered among unfrequented valleys or quaint little towns or remote mountain sides.

This book will help to make the Abruzzi better known and to attract visitors to this highland region. The author has written very carefully and shows many aspects that make the Abruzzi worthy of the attention and admiration of a wider public. She fully describes both the country and the people. The colored views are an interesting feature.

The Cathedrals of Northern France. By T. Francis Bumpus. x and 396 pp., map and illustrations, appendix and index. James Pott & Company, New York, 1910. 7½ x 5.

The cathedrals here described are north of the Loire as far as the confluence of the Allier River, and thence north of a straight line, joining the Allier mouth with the Ardennes. The usefulness of the book as a touring companion is increased by grouping the great churches in their respective archiepiscopal provinces. Twenty-seven pages are given to a sketch of the development of the French cathedrals, which is followed by descriptions of twenty-five of them. The book is the outcome of years of study and observation, and will be very useful to all travelers who wish to know more of the ecclesiastical "glories of France."

Les Grands Ports de France, leur Rôle économique. Par Paul de Rousiers. vii and 258 pp. Librairie Armand Colin, Paris, 1909. F. 3.50.

Geographers interested in the influence of location, environment and political conditions, on the rise and decline of human settlements, owe the author special gratitude for this book. He first establishes a classification of seaports, according to their functions, which he designates as commercial, regional or industrial. The commercial function is the oldest, because the ports originally served only as depots and points of distribution for ocean goods; it is the prominent function of many ports even to-day. The regional function came to the front when the economic development of the respective hinterlands was so far advanced that their exports determined the character of the ports; and the youngest of the three, the industrial function, was due to the advantage of working up raw materials from abroad as near the place of their importation as possible. Ports which occupy a commanding position in the world's trade must have more than one function nowadays, and the time of one-function ports seems gone by. The large and fast ships of the present require enormous quantities of freight to make their trips pay, and neither of these functions alone can furnish enough traffic for any port to make it worth while for modern vessels to call there.

From these points of view, the author determines the respective functions of the great ports of France, and their influence on the development of these functions.

Dunkirk seemed to be limited to the function of a merely commercial or strategic harbor; it was one of the few protected places on a dangerous coast, and had no natural connection with the hinterland. But when the cotton and beet sugar industries of northeastern France developed, and the natural outlet of that region, Antwerp, was on foreign territory, a national port had to be created and an artificial connection, the Lille-Dunkirk Railroad, was established between the isolated port and the hinterland. Thus Dunkirk became a regional port contrary to all geographical conditions, and as such it is now having a degree of prosperity never known under the old régime.

In the case of Havre, one would expect a mainly regional port, owing to its location at the mouth of one of France's largest rivers. But the contrary is the case, because the shallow and unreliable course of the lower Seine is an obstacle, rather than an encouragement, to commerce upstream. Havre, therefore, has been at all times, and is even now, pre-eminently a commercial port, more especially the great international coffee market of Europe. Her business men represent the pick of their class from France, England, Belgium, Germany, and their combined efforts have made the place what it is to-day. As they are mostly foreigners, however, this prosperity does not seem to rest on a very safe basis, because, if they should ever find another place more suited for their business, they would turn their backs on Havre. It is fortunate, therefore, that the advent of the railroad has given it a chance to become also a regional port for the cotton industry of Normandy, and this function might be greatly extended if the country were not in the grip of one railroad company, so that for purposes of transportation, Bremen is a nearer port to central and eastern France than Havre. It is therefore difficult to secure enough return freight for the large steamers that leave cargoes there. Attempts have been made to start a number of industries near the port, the products of which are expected to supply this need. Thus, the regional and industrial functions may preserve the commercial factor in its original intensity.

Rouen, on the other hand, is a typical example of the working of favorable geographic conditions. It is at the head of navigation, and owns the first bridge that spans the river. Thus built on both banks of the river, it controls the country on both sides in addition to that upstream which, to make the advantages of its location complete, includes Paris. Hence, Rouen has always been a thriving port and a wealthy city, and there is no prospect of a change in the near future, as the railroads centering there have only served to intensify its relations with that vast and progressive hinterland.

Nantes one would expect to be the Rouen of the Loire and of Orleans; but in spite of the sameness of geographical environment, its functions were radically different, owing to political conditions. Nantes never was the regional port of the Loire country, because under the old régime, when France was divided into a number of commercial provinces, it was made the port of Brittany, with which it had almost no connection. Its only possibilities, therefore, were on the high seas, and thus Nantes became the seat of West Indian traffic and a kind of French Hanse town, which amassed fabulous wealth by trade in sugar and "black ivory." The rise of the beet sugar industry, and the emancipation of the slaves, proved, of course, deadly blows to this prosperity, and even the letting up of the artificial barrier between it and the hinterland could not avert the decline,

because in the meantime railroads had connected that hinterland also with other ports, and the shallow Loire was inadequate for navigation with modern boats, so that it could not even maintain the competition by a cheaper waterway. Nothing but deep sea fishing was left to the descendants of the Nantes Vikings, and a few industries which have been started there more recently are far from sufficient to give the place any of its former importance. Nothing but the improving of the Loire waterway can redeem the situation by allowing the port at last to come into its own as the regional port of that large part of France which geographically belongs to the Loire and its tributaries.

The same causes which deprived Nantes of its natural hinterland, gave one to La Rochelle, which was, by nature, as isolated as Dunkirk. The division of France into commercial provinces made La Rochelle the port of "La province des 5 grosses fermes," *e. g.* the Loire country. It owed this preference, probably, to the fact that, between independent Nantes in the north and Bordeaux in the south, which used to be English as much as French, it had been, through all the Middle Ages, the only royal port on the western coast. When its monopoly fell, railroads had come to supply connections where nature had not provided for them, so that the port did not suffer from the change. Indeed, the needs of the Nineteenth Century brought out a new advantage of its location, because it was as near the coal fields of England on one side as it was of the parts of France in greatest need of that article on the other. Its business, therefore, went on increasing so much that a new harbor was built at La Pallice, and this harbor, with its modern facilities, in its turn attracted there more traffic, and especially the large transatlantic steamers that began to find Bordeaux inadequate for their needs. Owing to such improved chances for ocean transportation, a large part of what was originally Bordeaux hinterland has become tributary to La Rochelle and this process is still continuing.

Bordeaux is thus falling considerably behind in the race, and this is owing to several causes. Its former supremacy rested on a purely commercial basis, namely, on the trade with Santo Domingo and the West Indies generally, which was killed by the loss of that colony. It still had the wines of the Gironde country to fall back on; but the demand for those wines has considerably decreased, both at home and abroad. The hinterland, or what is left of the hinterland, owing to the competition of La Rochelle—La Pallice, is not progressive, it has remained stationary for generations and it is self-sufficient to-day as it was centuries ago. The only regional freight handled at Bordeaux at present is the pine timber from the Landes, which is exchanged for coal from England. Like Nantes, Bordeaux has taken to fishing to make up for the falling off in its trade, and its suburb of Beigles bids fair to become the Gloucester, Mass., of France, as thirty of the thirty-eight drying establishments of France are located at this place. Recently the location at Bordeaux of the rubber market of France promises to give its trade a new impetus. The greatest problem of the present is, however, how to increase the exports of the place, for there is a constant lack of return freight for the steamers that unload there. As the hinterland is not likely to fill this want in the near future, it is only by creating local industries that Bordeaux can hope to regain some of its former prominence, which the commercial function alone has not been able to maintain.

Marseilles, finally, has always been the largest port of France, in spite of varying geographical and historical conditions. It owes this superiority to its excellent commercial opportunities. For all parts of western Europe, it is the nearest port on the Mediterranean to embark for the Orient, and since the open-

ing of the Suez Canal it is the door even to the Far East; it is the only port of the Rhone valley, and in addition, the port par excellence for the African possessions of France. While the regional opportunities, too, seem larger than those of any other French port, its regional function is not, however, as important. The passenger traffic alone is proportionate to it; but for freight the connections of the upper parts of the Rhone valley are much better via the Atlantic ports than downstream, where navigation is far from satisfactory. There is some danger that even the unexcelled commercial position of Marseilles may be shaken if the regional function, or the industrial, continues to be thus disregarded. For a great international port like this needs domestic traffic to keep the foreign trade going, and of the domestic kind, Marseilles has too little for modern conditions. Like Bordeaux, Marseilles has begun, therefore, to supplement its business by industrial pursuits, but they suffer from the lack of adequate facilities for transportation from the factory to the port, which often costs as much as the freight all the way from Marseilles to the Black Sea, as almost all the goods must be carted. The construction of a barge canal is therefore under discussion, and there is no doubt that in this way the whole region would receive a new impetus which would considerably benefit the business of the port.

M. K. GENTHE.

GENERAL

Geographisches Jahrbuch. XXXIII. Band, 1910. Herausgegeben von Hermann Wagner. Gotha, Justus Perthes, 1910. 472 pp. 15 marks. 9 x 5½.

The current edition of this indispensable summary of the literature of all branches of geography is mainly devoted to general geography. The progress made in cartography (projections, map drawing, cartometry) in 1906-08 is reviewed by Dr. H. Haack (pp. 119-204); in dynamic geology in 1903-04 by Dr. E. Tams, pp. 79-118 (this division represents a part of the section formerly entitled "Fortschritte der Geophysik der Erdrinde," edited by Prof. E. Rudolph); in regional geology in 1907-09, by Prof. Toula (pp. 205-314); in oceanography in 1903-09, by Dr. L. Mecking, pp. 395-454 (formerly in the hands of Prof. Krümmel); in geographic meteorology in 1906-08, by Dr. W. Gerbing (pp. 3-78); in plant geography in 1905-09, by Dr. L. Diels, pp. 315-394 (a section that has been in Prof. Drude's hands for nearly 30 years). The usual systematic index of the whole cycle embraced by the summaries of the *Jahrbuch* enables one to determine in which volume is to be found the most recent review of any given subject.

W. L. G. J.

Vergleichende Untersuchungen über Flussdichte. Von Ernst Puls. Dissertation, Universität Kiel. pp. 39. Hamburg, 1910. 9 x 5½.

An investigation of the density of the drainage systems of certain typical districts, based on planimetric and curvilinear measurement, respectively, of their areas and their water courses. Drainage density is represented by the quotient of the area of a district divided by the length of its water courses. Two districts in the Northern Plain and five in the Central Highlands of Germany are discussed together with one example each of an Alpine and a Mediterranean district as represented by the region adjoining the Jungfrau and by the province of Attica.

W. L. G. J.

NEW MAPS

EDITED BY THE ASSISTANT EDITOR

MAPS ISSUED BY UNITED STATES GOVERNMENT BUREAUS

U. S. GEOLOGICAL SURVEY

Maps in U. S. G. S. Bulletins.

MINNESOTA. (a) Topographic Map of Southern Minnesota, by O. E. Meinzer. 2 colors. [Relief in contours, interval 100 ft.]. (b) Map of Southern Minnesota Showing Thickness and Character of Surface Deposits, by C. W. Hall, O. E. Meinzer and M. L. Fuller. 7 symbols in colors. (c) Map of Southern Minnesota Showing Occurrence of Granitic Rocks and Sioux Quartzite, by O. E. Meinzer. 10 symbols and colors. (d) Map of Southern Minnesota Showing Underground Water Conditions, by C. W. Hall, O. E. Meinzer and M. L. Fuller. 16 symbols in colors. All four maps: 1:750,000 approx. (1 in.=11.8 miles approx.). (45°25' - 43°30' N.; 96°26' - 91°16' W.). Accompany, as Pls. I, II, III and IV "Geology and Underground Waters of Southern Minnesota," by C. W. Hall, O. E. Meinzer and M. L. Fuller, *Water Supply Pap.* 256, 1911. [Map (a) the basis for maps (c) and (d).]

TEXAS. (a) Geologic Map of Texas. [1:7,500,000 approx. (1 in.=118.4 mile approx.).] Black. (b) General Geologic Map Showing Location of Burnet and Llano Quadrangles, Texas, with principal quarries, mines and prospects. 1:750,000 (1 in.=11.84 miles). (31°15' - 30°10' N.; 99°15' - 97°35' W.). 3 colors. (c) Economic and Geologic Map of Llano Quadrangle, Texas. 1:125,000 (1 in.=1.97 miles). (31°0' - 30°30' N.; 99°0' - 98°30' W.). Topography surveyed in 1898-99; culture revised in 1909. Geology surveyed in 1908-09. 12 colors. [Geology superimposed on topographic map; contour interval 25 ft. Elevations 8 ft. too high.] Accompany, as Pls. I, II and III, "Mineral Resources of the Llano-Burnet Region, Texas, with an Account of the Pre-Cambrian Geology," by S. Page, *Bull.* 450, 1911. [Map (a) modifies and supplements geology of trans-Pecos Texas as given on the geologic map of North America, 1:5,000,000, compiled by Gannett and Willis, 1906. Region represented on maps (b) and (c) is the area of pre-cambrian and paleozoic rocks N.W. of Austin exposed by erosion above the surrounding Cretaceous strata.]

WYOMING. (a) Map of Lander Oil Field, Wyoming, with sections. By E. G. Woodruff. 1:63,360 (1 in.=1 mile). [Oriented N. 31° E.]. (43°15' - 42°40' N.; 108°55' - 108°30' W.). 10 symbols in colors. With index map showing general location. [Relief in contours, interval 100 ft.]. (b) Map of Salt Creek Oil Field, Natrona County, Wyoming. By C. H. Wegemann, assisted by R. W. Howell and W. Mulholland. 1:63,360. (43°30' - 43°12' N.; 106°30' - 106°7' W.). 1 color. Accompany, as Pls. I and VII, "The Lander and Salt Creek Oil Fields, Wyoming," by E. G. Woodruff and C. H. Wegemann, *Bull.* 452, 1911.

WEATHER BUREAU

WORLD. [Three charts representing:] (1) Annual average isobars; isotherms of air; cold ocean currents; warm ocean currents, land. 3 colors. [Gall's cylindrical projection: mean scale 1:300,000,000 approx.]. (2) Normal wind directions and velocities for January and February. 1 color. (3) Normal wind directions and velocities for July and August. 1 color. [Maps (2) and (3) on Mercator projection: equatorial scale 1:240,000,000 approx.]. Accompany, as Figs. 1, 2 and 3, on pp. 9, 10, 11, paper on "Origin of the Permanent Ocean Highs," by W. J. Humphreys, *Bull. Mt. Weather Obs.*, Vol. 4, Part 1, pp. 1-12, 1911.

BUREAU OF ETHNOLOGY

MEXICO AND CENTRAL AMERICA. Linguistic Map of Mexico and Central America. By C. Thomas, assisted by J. R. Swanton. 1909. 1:7,000,000 approx. (1 in.=110.5 miles approx.). (33° - 7° N.; 118° - 77° W.). Accompanies treatise with similar title by same authors, *Bull.* 44, 1911. [Distinguishes between 30 linguistic stocks, exclusive of subdivisions.]

NORTH AMERICA

UNITED STATES

LOUISIANA. [Map of] Forest Regions [of] Louisiana. Field Examination by J. H. Foster, Feb. and March 1910. [1:3,750,000 approx. (1 in.=59.2 miles).] Black. Accompanies, on p. 414, "The Case of the State of Louisiana," *Amer. Forestry*, Vol. 17, pp. 414-423, 1911.

WISCONSIN. (a) General Plan for District of the Four Lakes, Madison, Wisconsin. 1910. [1 in.=1 mile (1:63,360). Scale incorrectly given on original.] (43° 10' - 43° 55' N.; 89° 30' - 89° 12' W.). Black. [Based on U. S. G. S. topographic sheets. Relief in contours, interval 20 ft. Woods shown.] (b) The Park System of the City of Madison, Wisconsin. 1909. Approximate scale 850 ft.=1 in. (1:10,200). 2 colors. (c) A Suggestive Plan for Madison, a Model City. [1 in.=½ mile. (1:31,680.) Scale incorrectly given.] 3 colors. [Relief in contours, interval 20 ft. Comprises nearer environs of Madison.] All three plans by John Nolen, Landscape Architect, Cambridge, Mass. Accompany "Madison: A Model City," by John Nolen, Boston, 1911.

NORTH AMERICA. U. S. Biological Survey Fourth Provisional Zone Map of North America. By C. H. Merriam, V. Bailey, E. W. Nelson and E. A. Preble. 1910. [1:40,000,000 approx. (1 in.=631.3 miles approx.).] 6 colors. Frontisp. of "Check-list of North American Birds prepared by a Committee of the American Ornithologists' Union," 3rd edition (revised), New York, 1910. [The fourth edition of this standard map of the bio-geographic provinces of North America.]

SOUTH AMERICA

ARGENTINA. Die Vorkordillere zwischen den Flüssen Mendoza und Jachal (Argentinien). Nach eigenen Reiseaufnahmen, nach Eisenbahn- und anderen Vermessungen entworfen von Dr. Richard Stappenbeck. 1:500,000 (1 in.=7.89 miles). (29° 50' - 33° 3' S.; 70° 30' - 68° 5' W.). 4 colors. Accompanies, as Taf. 53, paper with same title by same author, *Pet. Mitt.*, Vol. 57, I, pp. 293-297, 1911. [Valuable. Embodies results of original explorations.]

COLOMBIA-BRAZIL. Die Forschungsreise des Dr. Hamilton Rice im Flussgebiet des Rio Caiary-Uaupés. 1:1,000,000 (1 in.=15.78 miles). (3° - 0° 55' N.; 72° 50' - 71° 15' W.). 2 colors. With inset, 1:7,500,000, showing general location. Accompanies, as Taf. 54, notice with same title by T. Koch-Grünberg, *Pet. Mitt.*, Vol. 57, I, pp. 297-298, 1911.

AFRICA

AFRICA. [Three maps of Africa showing:] I (a) Der papillote äthiopische Bogen und sein Einflussgebiet; (b) Der traverse erythräische Bogen und sein Einflussgebiet. II Der escharpe Bogen (äquatorial oder vormalaisch). III Der frontale Bogen und sein Einflussgebiet. [1:40,000,000 (1 in.=631.31 miles).] 3 colors. Accompany "Kulturtypen aus dem Westsudan" by Leo Frobenius, *Pet. Mitt., Erght.* No. 166, 1910. [Show the territory in which various types of bows are in usage.]

AFRICA. (a) Isotherms for Africa. January. (b) Isotherms for Africa. July. Both maps 1:36,000,000 (1 in.=568.17 miles). Black. Accompany "Isotherms for Africa," by J. I. Craig, *Cairo Scient. Journ.*, Vol. 5, pp. 124-125, 1911. [Interval 2° C. Based on Survey Dept. observations, Buchan-Herbertson's Atlas of Meteorology and on Hann. English edition of the plates to be used in Arabic school atlas under preparation by Survey Dept. of Egypt.]

ALGERIA-MOROCCO. Zones Pacifiées de 1903 à 1910 [on Algerian-Moroccan frontier]. [1:5,000,000 approx. (1 in.=78.9 miles approx.). Scale incorrectly given on the original.] (36° 20' - 30° 0' N.; 5° 0' W. - 0° 10' E.). Black. Accompanies, as Fig. 68 on p. 356, review of A. Bernard's "Les confins algéromarocains," by J. Brunhes, *La Géogr.*, Vol. 23, pp. 357-368, 1911.

ALGERIA-TUNIS. (a) Algérie-Tunisie-200,000°. État d'avancement des travaux au 31 Décembre 1909. Tableau d'Assemblage des Cartes d'Algérie et de Tunisie au 50,000° et au 200,000°. 4 symbols in colors. (b) Carte de Tunisie au 100,000°. État d'avancement des travaux au 31 Décembre 1909. 3 symbols in colors. Both maps 1:3,160,000 approx. (1 in.=49.9 miles approx.). Taf. 57

and 58, *Pet. Mitt.*, Vol. 57, I, 1911. [Index maps. Originally published as Pls. XI and XII of report of Service Géogr. de l'Armée for 1909. Cf. also note in *Bull.*, Vol. 43, p. 547 (July, 1911).]

BRITISH EAST AFRICA. East Africa Protectorate. [Sheet] Malindi and Surrounding Country. [Map of] Africa. 1:62,500. (1 in.=0.99 mile.) ($3^{\circ}0' - 3^{\circ}22\frac{1}{2}'$ S.; $40^{\circ}0' - 40^{\circ}12\frac{1}{2}'$ E.). 3 colors. Geographical Section, General Staff, No. 2546. Surveyed under the direction of the Director of Surveys, East Africa Protectorate, in 1909. Printed at the War Office, March, 1911. Price 1s. 6d. [Relief in approximate contours in brown, interval 50 ft.; drainage in blue, vegetation in green. Similar in type to the map of the East Africa Protectorate, 1:125,000, listed in the *Bull.*, Vol. 43, p. 471 (June, 1911).]

CAPE OF GOOD HOPE AND BECHUANALAND PROTECTORATE. Kärtchen der Eisbewegung zur Dwyka-Eiszeit am Oranje und Vaal. 1:6,000,000 (1 in.=94.68 miles). ($26\frac{2}{3}^{\circ} - 30\frac{1}{2}^{\circ}$ S.; $21\frac{3}{4}^{\circ} - 25\frac{3}{4}^{\circ}$ E.). Black. Accompanies note on "Paläozoische Eiszeit Spuren in der Kapkolonie," *Ztschrft. für Gletscherkunde*, Vol. 5, p. 316, 1911. [Direction of glacial striæ, where observed, indicated by arrows.]

MOROCCO. Maroc au 500,000^e. Réfection: État d'avancement des travaux au 31 Décembre 1909. [1:10,000,000 (1 in.=157.83 miles).] 3 symbols in colors. Taf. 59, *Pet. Mitt.*, Vol. 57, I, 1911. [Index map. Originally Pl. XVI, Report Service Géogr. de l'Armée for 1909. Cf. note under Algeria-Tunis.]

MOROCCO. La Frontière Orano-Marocaine Septentrionale. [1:1,000,000 approx. (1 in.=15.8 miles approx.).] ($35^{\circ}33' - 34^{\circ}13'$ N.; $3^{\circ}25' - 2^{\circ}15'$ W.). Black. Reproduced from "Les Confins algéro-marocains," by A. Bernard in *L'Afrique Franç.*, Vol. 21, p. 209, 1911.

MOROCCO. Plan de la ville de Fez. [1:30,000 (1 in.=0.47 mile). D'après la Carte du Maroc de M. De Flotte (Levés du Cne. Larras). Black. Accompanies, on p. 409, note on Fez by J. S., *Rev. Franç. de l'Étrang. et des Colon.*, Vol. 36, pp. 406-412, 1911. Reproduced from *Bull. du Com. de l'Afr. Franç.*]

NYASALAND PROTECTORATE. Carte Géologique du Nyassaland par MM. A. R. P. Andrew et T. E. G. Bailey. 1:5,500,000 (1 in.=86.80 miles). ($9^{\circ}15' - 17^{\circ}15'$ S.; $33^{\circ}15' - 36^{\circ}0'$ E.). Black. 6 symbols. Accompanies, as Fig. 72 on p. 381, note on "La Carte géologique du Nyassaland," by P. Lemoine, *La Géogr.*, Vol. 23, pp. 380-381, 1911. Reproduced by permission from paper by same authors, *Quart. Journ. Geol. Soc.*, London, Vol. 66, pp. 189-237, 1910.

SÃO THOMÉ AND PRINCEPE. (a) Carta da Ilha de S. Thomé. 1:150,000 (1 in.=2.36 miles). ($0^{\circ}27' \text{ N.} - 0^{\circ}6' \text{ S.}; 6^{\circ}23' - 6^{\circ}47' \text{ E.}$) With inset "Cidade de S. Thomé," 1:25,000 (1 in.=0.39 mile), and view of island of St. Thomé. Black. Comissão de Cartographia [Lisbon] 1902. (b) Carta da Ilha do Principe com a divisão das principaes explorações agricolas. 1909. [1:85,000 approx. (1 in.=1 $\frac{1}{3}$ mile approx.).] ($1^{\circ}45' - 1^{\circ}30' \text{ N.}; 7^{\circ}20' - 7^{\circ}30' \text{ E.}$) With view of Island of Principe. 6 colors. Accompany "Manual Labour in S. Thomé and Principe" by Francis Mantero, translated from the Portuguese, Lisbon, 1910. [Map (a) a copy of that issued by the Portuguese Admiralty. Relief in hachures. Map (b) shows the boundaries of land concessions.]

ASIA

ASIA MINOR. Geologische Karte des Westlichen Kleinasien, Blatt 1, von Alfred Philippson. 1:300,000 (1 in.=4.73 miles). ($40^{\circ}31' - 39^{\circ}0' \text{ N.}; 35^{\circ}50' - 28^{\circ}10' \text{ E.}$) 25 colors. Accompanies "Reisen und Forschungen im Westlichen Kleinasien, I. Heft," by Dr. Alfred Philippson, *Pet. Mitt.*, *Erghft.* No. 167, 1910. [Geology superimposed on the corresponding sheet of Philippson's topographic map of western Asia Minor referred to in the July *Bull.*, p. 548. 24 geological subdivisions are shown.]

CHINA. Itinéraires du Capitaine Harfeld dans le Hou Nann et le Kiang Si en 1903 et 1904. [1:1,300,000 approx. (1 in.=20 $\frac{1}{2}$ miles approx.).] ($29^{\circ}51' - 27^{\circ}30' \text{ N.}; 110^{\circ} - 114\frac{1}{3}^{\circ} \text{ E.}$) Black. With inset "De Liou Linn Tza: au Mines d'Or de Yu Kâ Tsonn et de Hou Lou Wann, 1:50,000" (1 in.=0.79 mile). Accompanies, facing p. 182, "Contribution à la Géographie du Hou Nann," by F. Harfeld, *Compte Rendu*, IXème Congr. Intern. de Géogr., Tome III, pp. 181-205, Geneva, 1911.

CHINA. Sketch Map Showing the Position of Lake Shang-ie. 1:5,000,000 (1 in.=78.91 miles). (35° N. and $103\frac{1}{4}^{\circ}$ E.). With inset, 1:40,000,000, showing location of main map. Black. Accompanies note on "A Mountain Lake in Kansu," *Geogr. Journ.*, Vol. 37, p. 661, 1911.

INDIA. Sketch to illustrate a journey into the Abor Country, N. E. frontier of India, by Col. D. M. Lumsden and Noel Williamson, 1909. 1:400,000 (1 in.=6.31 miles). ($28^{\circ}30' - 28^{\circ}0' N.$; $94^{\circ}56' - 95^{\circ}25' E.$) With inset, 1:18,000,000, showing the location of main map. Black. Accompanies on p. 623, paper with similar title by same authors, *Geogr. Journ.*, Vol. 37, pp. 621-629, 1911.

JAPAN. Geological Map of Japanese Empire. 1:2,000,000 (1 in.=31.56 miles). ($48^{\circ} - 29^{\circ} N.$; $123^{\circ} - 149^{\circ} E.$) 22 colors. With insets: (a) General Map of Japanese Empire, 1:12,000,000 (1 in.=189.39 miles), showing extent of political dominions; (b) 5 insets, 1:4,000,000 (1 in.=63.12 miles), of (1) southern half of Karafuto (Sakhalin Island), (2) Chishima (Kurile Islands), (3) Kwantōshu (Port Arthur Peninsula) and Neutral Territory, (4) Taiwan (Formosa) and Ryūkyū Islands, (5) Ogasawara-Jima (Bonin Islands). Imperial Geological Survey of Japan. Kinoshuku Inouye, Director. Geologists: D. Sato, T. Iki, D. Yamashita, E. Sagawa, Y. Otsuki, J. Ohikata, S. Noda, S. Kōzu, S. Nakamura. 4 sheets. Lith. Y. Koshiba, Tokyo. Feb. 1911. Nomenclature in Japanese and in English. Accompanied by a summary of the "Geology of the Japanese Empire and the Korean Peninsula," 4 pp., in English and in Japanese. [A fundamental general geologic map of Japan based on the standard 1:5-sheet "Geological Map of the Japanese Empire on the Scale of 1:1,000,000. Compiled by the Imperial Geological Survey of Japan, 1902." Its differentiation of igneous rocks, notwithstanding the smaller scale, is more detailed than that of the earlier map, which distinguishes between four groups, while the present map lists ten kinds of igneous rocks. The geological coloring distinguishes between Gneiss, Crystalline Schist, Paleozoic, Mesozoic [undifferentiated], Triassic, Jurassic, Cretaceous, Tertiary, Diluvium, Alluvium, Raised Coral Reef; Granite, Porphyry, Diorite, Gabbro, Peridotite, Serpentine, etc. [one color for the last three], Diabase, Porphyrite, Liparite, Andesite, Basalt, Volcanic Ash and Mud Lava. Due to the expansion of the Japanese Empire since the Russo-Japanese War the geologic coloring has been extended to include Korea, the Liao-tung Peninsula and the southern half of Sakhalin.]

JAPAN. (a) Map Showing the Distribution of Several Types of the Copper Deposits in Japan. 1:10,000,000 (1 in.=157.83 miles). ($46^{\circ} - 30^{\circ} N.$; $125^{\circ} - 147^{\circ} E.$) 4 colors. (b) Map Showing the Distributions of Principal Coal and Oil Fields in Japan. 1:20,000,000 (1 in.=315.66 miles). ($50^{\circ} - 20^{\circ} N.$; $120^{\circ} - 147^{\circ} E.$) Black. (c) [Map Showing the Distribution of] Some Important Mines in Japan. 1:5,000,000 (1 in.=78.91 miles). ($47^{\circ} - 30^{\circ} N.$; $128^{\circ} - 148^{\circ} E.$) With insets of S. Sakhalin, Kurile and the Ryu-kuy Islds. and of the Chikuhō Coal Field (the latter 1:500,000 [1 in.=7.89 miles]). 1 color. Accompany, as Pls. I, II and III, facing pp. 72, 116 and 144, "Mining in Japan: Past and Present," Bureau of Mines, Dept. of Agric. and Comm. of Japan. 1909.

PALESTINE. Karte des Ostjordanlandes [in 12 Blatt] aufgenommen von Dr. G. Schumacher, herausgeg. vom Deutschen Verein zur Erforschung Palästinas. 1:63,360 (1 in.=1 mile). Blatt A5 ($32^{\circ}25' - 32^{\circ}55' N.$; $35^{\circ}30' - 35^{\circ}52' E.$). Blatt B5 ($32^{\circ}25.0' - 32^{\circ}55' N.$; $35^{\circ}52' - 36^{\circ}14' E.$). 5 colors. [Relief in gray-brown shading, periodic streams in brown, permanent ones in blue. A valuable detailed map. Sheets A5 and B5 comprise the region east of the Jordan and N. of the Wadi Serka.]

SUMATRA. Das südliche Sumatra mit dem Wohngebiet der Kubus im zentralen Urwald. 1:3,000,000 (1 in.=47.34 miles). ($1^{\circ} - 6^{\circ} S.$; $100^{\circ} - 106^{\circ} E.$) Black. Accompanies paper on "Die Religionslosigkeit der Kubus auf Sumatra," by W. Volz, *Pet. Mitt.*, Vol. 57, I, pp. 288-292, 1911.

TURKEY-PERSIA. Die Tektonische Bedingtheit der Kurdensitze. 1:10,000,000 (1 in.=157.83 miles). ($42^{\circ} - 33^{\circ} N.$; $35^{\circ}50' E.$) Black. Accompanies, on p. 287, paper on "Kurdistan—ein länderkundlicher Begriff?" by E. Banse, *Pet. Mitt.*, Vol. 57, I, pp. 286-288, 1911.

AUSTRALASIA AND OCEANIA

DUTCH NEW GUINEA. Map to illustrate the expedition of H. A. Lorentz, LL.D., in Dutch New Guinea. 1907-09. 1:400,000, or 1 in.=6.31 miles. Accompanies paper by same author on "An Expedition to the Snow Mountains of New Guinea," *Scott. Geogr. Mag.*, Vol. 27, pp. 237-359, 1911. Published by permission of Royal Geogr. Soc. [Same map as that listed in *Bull.*, Vol. 43, p. 472.]

EUROPE

AUSTRIA. Waldgrenzkarte der Österreichischen Alpen von Dr. Richard Marek. 1:1,000,000 (1 in.=15.78 miles). 2 colors. Accompanies "Waldgrenzstudien in den Österreichischen Alpen" by Dr. R. Marek, *Pet. Mitt., Erglft.* No. 168, 1910. [Area represented bounded on the N., W. and S. by the political boundary of Austria and on the N., E. and S. E. by the physical boundary of the eastern Alps. Situation is shown by means of the drainage system. The tree lines of equal altitude are shown in green, with an interval of 100 meters. The legend unfortunately gives rise to confusion as it incorrectly designates these lines as 'Isohyeten' instead of 'Isohylen,' as correctly used in the text. Numerals in black indicate the average number of days on which precipitation occurred during the growing season in the period from 1898 to 1902.]

BALKAN PENINSULA. (a) Les Lacs Égéen et Pannonien au Miocène dans la Péninsule Balkanique. 1:3,000,000 (1 in.=47.34 miles). $45\frac{1}{2}^{\circ}$ - $38\frac{5}{6}^{\circ}$ N.; $19\frac{1}{2}^{\circ}$ - 25° E.) Black. (b) Carte du Lac Égéen par J. Cvijić. 1:75,000 (1 in.=11.84 miles). ($41^{\circ}30'$ - $40^{\circ}30'$ N.; $20^{\circ}35'$ - $23^{\circ}50'$ E.) 3 colors. Accompany, as Pls. 16 and 17, paper on "L'Ancien Lac Égéen," by J. Cvijić, *Ann. de Géogr.*, Vol. 20, pp. 233-259, 1911. [Map (b) distinguishes between pre-lacustrine valleys, two groups of terraces belonging to "Lac Égéen" and two to the isolated lake basins. Shows maximum extent of "Lac Égéen" and extent of present lakes. Symbols for gravel, lacustrine deposits, faults.]

CENTRAL EUROPE. Das Mitteleuropäische Eisenbahnnetz beim Ausbruch des deutsch-französischen Krieges. 1:3,500,000 (1 in.=55.24 miles). (56° - 45° N.; 2° - 22° E.). 6 colors. Accompanies, as Taf. 60, paper on "Das Deutsche Eisenbahnnetz 1870 und 1911 in militärgeographischer Hinsicht" by Ferrarius, *Pet. Mitt.*, Vol. 57, I, pp. 323-325, 1911. [Copy of sheet from Stieler's Hand Atlas, edition of 1870.]

FRANCE. (a) Carte tectonique de la région charentaise. (b) Les différents cycles d'érosion dans la région de la Charente. Both maps: 1:1,000,000 (1 in.=15.78 miles). ($46^{\circ}20'$ - $45^{\circ}20'$ N.; $1^{\circ}30'$ W. - $1^{\circ}10'$ E.) Black. Accompany, as Figs. 1 and 2, on pp. 215 and 217, paper on "Les Origines de la Vallée de la Charente," by C. Passerat, *Ann. de Géogr.*, Vol. 20, pp. 213-232, 1911. [On map (a) distinction made between crystallines of the Massif Central, Jurassic limestones of intermediate regions and Cretaceous limestones of coast. Faults, anticlines and synclines shown. On map (b) symbols distinguish between the residual areas of the first cycle, the platforms of the second and third cycles, the valleys of the fourth cycle and the alluvial deposits of the first three cycles.]

GERMANY. Geologisch-morphologische Übersichtskarte der Ueckermünder Heide. Auf Grund der K. Keilhackschen Karten und eigener Untersuchungen gezeichnet von H. Seelheim. 1:250,000 (1 in.=3.95 miles). ($55^{\circ}52'$ - $53^{\circ}27'$ N.; $13^{\circ}42'$ - $14^{\circ}40'$ E.). Black. Accompanies "Die Ueckermünder Heide" by H. Seelheim, XII. *Jahresh. Geogr. Gesell. Greifswald* 1909-1910, pp. 73-193, 1911.

GERMANY. Die Sturmflut vom 30./31. Dezember 1904 an der Küste Pommerns von der Swine bis zum Darss. Entworfen von Dr. G. Krüger. 1:300,000 (1 in.=4.73 miles). ($54^{\circ}45'$ - $53^{\circ}53'$ N.; $12^{\circ}20'$ - $14^{\circ}20'$ E.). Black. Accompanies paper "Über Sturmfluten an den deutschen Küsten der westlichen Ostsee etc" by G. Krüger, XII. *Jahresh. Geogr. Gesell. Greifswald* 1909-1910, pp. 195-294, 1911.

GERMANY. (a) Volksdichtekarte von Neu-Vorpommern und der Insel Rügen bearbeitet von Dr. E. Müller. 10 symbols in colors. (b) Grösse und Lage der Wohnplätze von Neu-Vorpommern und der Insel Rügen bearbeitet von Dr. E. Müller. 1 color. Both maps 1:200,000 (1 in.=3.16 miles). ($54^{\circ}42'$ - $53^{\circ}50'$ N.;

12°25' - 13°55' E.). Accompany, as Taf. 1 and 2, "Beiträge zur Siedelungskunde Neu-Vorpommerns unter der Insel Rügen" by R. E. Müller. XII. *Jahresh. Geog. Gesell. Greifswald* 1909-1910, pp. 385-486, 1911. [Ten densities indicated on map (a); 13 sizes of towns on map (b).]

GERMANY. (a) Isochronenkarte des Gesamtverkehrs für Mitteldeutschland mit dem Ausgangspunkt Leipzig. Gezeichnet von J. Riedel. 1:1,500,000 (1 in.=23.67 miles). (53¾° - 48¾° N.; 8½° - 17° E.). 4 colors. (b) Isochronenkarte des Gesamtverkehrs für die weitere Umgebung von Leipzig. 1:500,000 (1 in.=7.89 miles). (51°55' - 51°0' N.; 11°30' - 13°20' E.). 10 colors. Accompany, as Taf. 51 and 52, paper on "Neue Studien über Isochronenkarten" by J. Riedel, *Pet. Mitt.*, Vol. 57, I, pp. 281-284, 1911. [Map (a) shows 3, map (b) 10 zones of distance in time from Leipzig, based on timetables for the summer of 1909.]

ICELAND. (a) Übersichtskarte der Gletschergebiete von Island von Hans Reck, nach einer Karte von Th. Thoroddsen. 1:3,000,000 (1 in.=47.34 miles). (66½° - 63½° N.; 24½° - 13½° W.) Black. (b) Kartenskizze der Umgebung des Tungnafells-Jökulls. 1:150,000 (1 in.=2.36 miles). (64°35' N. - 18°20' W.) Black. Accompany, on pp. 249 and 287, respectively, "Glazialgeologische Studien über die rezenten und diluvialen Gletschergebiete Islands," by H. Reck, *Ztschrft. für Gletscherkunde*, Vol. 5, pp. 241-297, 1911.

THE NETHERLANDS. (a) Historische Karte von Zeeland nach Utrecht Dresselhuys. (b) Das heutige Zeeland nach Kuijper. Both maps: Besondere Bearbeitung des Verfassers. 1:230,000 (1 in.=5.21 miles). (51°46' - 51°12' N.; 3°18' - 4°29' E.). Black. Accompany paper "Zur Geschichte und Natur der Schelde-Mündungen in der Niederländischen Provinz Zeeland" by F. Müller, *Ztschrft. Gesell. Erdk.*, Berlin, pp. 365-400, 1911.

RUSSIA. Die Schifffahrtswege Russlands. 1:10,000,000 (1 in.=157.83 miles). (62½° - 38° N.; 15° - 70° E.). 4 colors. Accompanies "Russische Grossschifffahrtswege" by R. Hennig, *Deutsche Rundsch. für Geog.*, Vol. 33, pp. 432-439, 1911. [Indicates navigable rivers; rivers having steam navigation; projected trunk waterways.]

SWEDEN. Geological Map of the Pre-Quaternary Systems of Sweden prepared and published by the Geological Survey of Sweden through A. E. Törnebohm. 2nd Edit. 1910. 2 Sheets. Scale 1:1,500,000 (1 in.=23.67 miles). (69° - 55° N.; 25° - 39° E.). 47 colors. Accompanied by "Explanatory Remarks to Accompany the Geological General Map, etc.," *Sverig. Geol. Undersökning*. Series Ba, No. 6, 52 pp. [The second edition of this standard general geologic map of Sweden, first published in 1901.]

SWEDEN. Karte öfver Mellersta Sveriges Landformer af Sten De Geer. 1:500,000 (1 in.=7.89 miles). 59°40' - 57°15' N.; 11°7' - 18°18' E.). 11 colors. With two geologic sections. Accompanied by "Explanation of Map of Land-Forms in the Surroundings of the Great Swedish Lakes" by Sten De Geer. *Sverig. Geol. Undersökning*, Series Ba, No. 7, 30 pp. [Important geo-morphologic map of Central Sweden. Distinguishes between escarpments of four altitudes, plateaus, depressions and plains. Indicate faults. Isobaths shown, interval 20 m.]

SWEDEN. Das Spätglaciale Süd-Schweden. Übersichtskarte mit Osen, Endmoränen und Schrammen von der Schwedischen Geologischen Landesanstalt ausgegeben durch Gerard De Geer, 1910. 1:500,000 (1 in.=7.89 miles). 60°4' - 55°50' N.; 11°8' - 19°27' E.). 3 colors. *Sverig. Geol. Undersökning*, Ser. Ba, No. 8. [Indicates late pleistocene territory in buff. Symbols for glacial striæ, terminal moraines, districts of morainic topography, eskers.]

TURKEY. Kirjali [Sheet]. [Map of] Turkey 1:250,000 (3.95 miles to an inch). (42°15' - 41°25' N.; 24°20' - 26°0' E.). 5 colors. Geographical Section, General Staff, No. 2097, based on the General Staff maps of Austria, 1903, and Turkey, 1898. Drawn at the War Office and photo-etched at the Ordnance Survey, Southampton, 1910. Printed at the War Office, 1910. Price 2/6. [Relief in approximate contours in brown, interval 250 ft., above 2,000 ft., interval 500 ft. Drainage in blue; forests in green; special symbols for vineyards.]

Distinguishes between four kinds of roads. Gives translation of 50 Turkish geographic terms. This map is a sheet of the map of Turkey in Europe, Eastern and Central, in 10 sheets, listed in *Bull.*, Vol. 43, p. 312 (April, 1911).]

POLAR

ARCTIC. The [North] Polar Regions Showing the Routes and Explorations of Robert E. Peary, U. S. N., from 1892-1906. [1:10,000,000 approx. (1 in.=158 miles approx.).] Black. Accompanies, facing p. 238, paper on "History and Field Work of the Peary Arctic Club," by H. L. Bridgman, *Compte Rendu*, IXème Congr. Intern. de Géogr., Tome III, pp. 228-241. Geneva, 1911. [Photograph of a map previously published. Shows routes of Peary's expeditions of 1892, 1893-95, 1898, 1902, 1906 (course of the *Roosevelt* and sledge journey).]

ANTARCTIC. (1) [Three maps of the adjoining parts of the Ross and Weddell Quadrants, 1:18,500,000 approx. (1 in.=292 miles approx.), (50° - 75° S.; 120° - 50° W.), entitled:] (a) Croquis Bathymétrique d'après les Observations de la *Belgica* et du *Pourquoi-Pas?* (b) Carte des Températures de l'Eau de Mer en Décembre et Janvier. (c) Carte des Densités de l'Eau de Mer en Décembre et Janvier. [Map (a) shows 500, 1,000, 2,000, 3,000, 4,000, and 5,000 meter isobaths. Map (b) shows isotherms of 1° interval and limit of ice-pack. Map (c) shows lines of equal density with interval of 0.00025. (2) Carte Bathymétrique Côtière [of West Antarctica from South Shetland Islands to Terre Charcot]. [1:5,000,000 approx. (1 in.=79 miles approx.).] (61° - 70° S.; 78° - 53° W.) Black. Accompany, as Figs. 1, 2, 4 and separate plate, "Principaux Résultats d'Océanographie physique, Expédition Antarctique du Docteur Charcot à bord du *Pourquoi Pas?* (1908-1910)," by J. Rouch, *Bull. de l'Inst. Océanogr.* No. 206, Monaco, April, 1911.

ANTARCTIC. (a) South Polar Regions. With the Antarctic Continent drawn to illustrate the probable topography as deduced from present available data by D. Mawson. 1:40,000,000 (1 in.=631.30 miles). (South of about 40° S.) 8 colors. (b) Supposed Antarctic Continent. Alternative configuration to that shown on the [previous] general map. 1:50,000,000 (1 in.=789.13 miles). (South of about 50° S.) Black. Accompany, as separate plate and as text-map, respectively, the latter on p. 613, paper on "The Australasian Antarctic Expedition," by Dr. D. Mawson, *Geogr. Journ.*, Vol. 37, pp. 609-620, 1911. [Map (a) delineates Antarctic Andes as continuous from Graham Land to South Victoria Land. Map (b) suggests as possible a depression between the margin of the Antarctic Plateau, considered as extending from Coats Land to South Victoria Land, and the Antarctic Andes, considered as joining Graham Land to King Edward VII Land. Map (a) shows ocean depths in six tints.]

GREENLAND. Carte Indiquant la Position de l'Isthme unissant l'Île Clavering au Continent (Côte Orientale du Grönland). No scale given. 1:2,500,000 approx. (1 in.=39.5 miles approx.). (74¼° N. and 21° E.). Black. Accompanies, as Fig. 73 on p. 384, note on "Changement récent survenu sur la côte orientale du Grönland" by C. Rabot, *La Géogr.*, Vol. 23, pp. 383-384, 1911. Reproduced by permission from *Geogr. Tidskr.*, Vol. 11, p. 25, 1911.

EDUCATIONAL

GOODE'S BASE MAPS. A series of outline maps for all classes of work in applied sciences and the various fields of research. Prepared by J. Paul Goode, Assoc. Prof. of Geogr., Univ. of Chicago. The University of Chicago Press, Chicago, Ill. The series consists of: No. 1. The World: Mercator projection. 2. North America. 3. South America. 4. Europe. 5. Asia. 6. Africa. 7. Australasia. 9. America (U. S.). 10. America (U. S.; state outlines only). 14. The British Isles. 15. Western and Southern Europe. 17. France. 18. The Spanish Peninsula. 19. Italy. 20. Central Europe. 21. The German Empire. 24. The Levant. 32. America (U. S.) by counties. In two sizes: 8 x 10½ inches, one cent each; 15 x 10½ inches, three cents each; except No. 32, which is issued 15 x 10½ inches at 3 cents each, and 21 x 15 inches at five cents each. Accompanied by circular of 4 pp.

A series of outline maps, of convenient size and arrangement to insert in notebooks, intended to serve as bases for the delineation of various phenomena in class work in geography, history, civics, economics, etc. They show the chief drainage features and mountains, political boundaries and the location of large towns, without nomenclature. In execution the line element is neat. Relief is not so successfully rendered and in some instances, particularly on Maps Nos. 2, 3 and 24, has hardly emancipated itself from the "caterpillar" method of treatment. To avoid the difficulty of the hachure method resort is had on some maps (14, 17) to a single contour for the expression of relief. The graticule is drawn in full only on the ocean surfaces, nominally to avoid overcharging the land surfaces because of their being the areas mainly coming into consideration in the delineation of various phenomena. Such a course is at least open to criticism as, precisely for this reason, guide lines are far more necessary on the land than on the water surfaces—a requirement which the indication of the intersection of the parallels and meridians on the land surfaces of these maps does not sufficiently meet.

The map of the United States showing county boundaries, is of value for statistical purposes, although on the $15 \times 10\frac{1}{2}$ inch edition the names are so small as to be hardly legible.

Such matters as the careless lettering of the degrees on Maps 9, 10, 20 and 24; the somewhat unusual designation of the United States as America on Maps 9, 10 and 32, although the latter term is followed by the former in parentheses; the fact that equivalency is ascribed to the polyconic projection, as is done in the circular with reference to Map 2; the absence of a map-net on the county maps of the United States, although referred to in the circular as drawn on the polyconic projection—all speak of a lack of unity of purpose and method regrettable in an educational publication. Nor does such self-laudatory comment as that contained in the accompanying circular to the effect that "From every point of view they [these base maps] are the finest issued in the country" recommend itself to one's favor. It seems rather unusual over the imprint of the University of Chicago Press.

GEOGRAPHISCHER VOLKSSCHUL-ATLAS FÜR VIER- BISSECHSKLASSIGE VOLKSSCHULEN. Ausgabe für Nieder-Österreich mit Ergänzung für Wien. Bearbeitet von Joh. Geog. Rothaug. 17 plates. G. Freytag & Berndt, Wien. K. 2.22. $13\frac{1}{2} \times 9\frac{1}{2}$ inches. [An atlas for Austrian grammar schools. Special edition for the Province of Lower Austria, of which one special map is given, and for Vienna, of which four maps are given. Physical coloring is the basis for the general maps. Although not equal to the best German school atlases of the same type, this atlas is very creditable.]

ATLASES

DENMARK. Danmark i 35 Kort med 3 Kort over Nordslesvig. Med fortegnelse over alle Danske Kogstaeder, Byer, Landsbyer, Stationer og Gaarde, samt Afstandene mellem alle de vigtigste Byer og Angivelse af Sevaerdigheder. "Politiken" 's Forlag, Copenhagen, 1910. [A handy pocket-atlas of Denmark and northern Schleswig published by one of the leading newspapers of Copenhagen. 34 plates, on the scale of 1:240,000 (3.79 miles to an inch), are devoted to Denmark and 3, on the scale of 1:300,000 (1 in.=4.73 miles), to northern Schleswig, which politically belongs to Germany, but linguistically to Denmark. An index map facilitates finding the relative position of each plate. The maps show no relief, but distinguish between woods, meadows, marshes, sand-dunes and tidal flats. Railroads, roads and steamship lines are shown. An index of place names is printed on the reverse of the maps and refers to the numbered squares into which the plates are divided. Very fair in execution.]

GENERAL

WORLD. Verbreitung der Bananenkultur. Entworfen von Dr. Richard Rung. [Mercator projection: equatorial scale 1:100,000,000.] 2 colors. Accompanies "Die Bananenkultur," by Dr. R. Rung, *Pet. Mitt., Erghft.* No. 169, 1911. [Distinguishes between an inner and an outer zone of banana cultivation.]

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BULLETIN
OF THE
AMERICAN GEOGRAPHICAL SOCIETY

Vol. XLIII

1911

No. 10

GLACIERS OF PRINCE WILLIAM SOUND
AND THE SOUTHERN PART OF THE
KENAI PENINSULA, ALASKA

IV.—GLACIERS OF THE SOUTHERN COAST OF THE
KENAI PENINSULA*

BY

U. S. GRANT AND D. F. HIGGINS

Much of the southern coast of the Kenai Peninsula, from Cape Puget at the western entrance to Prince William Sound to Port Chatham near the southwestern extremity of the peninsula, has been seldom visited and its glaciers are little known except for their approximate locations on the small scale charts of this region and for brief descriptions.† (Fig. 1.) In the summer of 1909 the writers studied this region and made a reconnaissance map of the coast line. All of the glaciers which reach tide water, or approach close to it, were seen and photographs were taken of many of these ice streams. Some of the photographs are here reproduced; these and others are preserved in the collection of the United States Geological Survey.

The southern coast of the Kenai Peninsula is deeply indented by bays which have mountainous shores, and snow-covered peaks are frequently in view near the heads of these bays. From this mountain area, the backbone of the Kenai Peninsula, glaciers extend

* Published with the permission of the Director of the United States Geological Survey.

Earlier articles in this series appeared in the *Bulletin*, vol. 42, 1910, pp. 721-738, and vol. 43, 1911, pp. 321-338, 401-417.

† Davidson, George. The glaciers of Alaska that are shown on Russian charts or mentioned in older narratives. *Trans. and Proc. Geog. Soc. of the Pacific*, series 2, vol. 3, 1904, pp. 1-98.

southward and southeastward towards the Pacific. Some of these ice streams, as the Bear, Northwestern and McCarty glaciers, are of large size and reach tide water. These glaciers and their surroundings form scenes of beauty and grandeur which deserve to be much better known than they are at present. Back from the shore line little exploration has been done and there are large areas which have not been visited even by prospectors. Ice fields of unknown but considerable extent exist within 5 to 20 miles of the coast line.



FIG. 1.—Map of the southern part of the Kenai Peninsula, showing the coastal glaciers.

One of the most extensive of these,—possibly consisting of two or more separate parts,—occupies the elevated district included between Tustumena Lake and Resurrection, Aialik and Nuka bays. Another large ice field exists between Nuka Bay and Kachemak Bay of Cook Inlet and sends glaciers downward both to the southeast and the northwest.

CAPE PUGET TO CAPE RESURRECTION

Between Prince William Sound and Resurrection Bay, or more strictly between Capes Puget and Resurrection, there are at least four marked indentations of the shore line and valleys opening into these bays. Each of these valleys contains a glacier which from

east to west are the Puget, the Excelsior, an unnamed glacier, and the Ellsworth. This coast lacks good harbors which are not exposed to the southerly winds and has consequently been little visited, except for Day Harbor, and not carefully mapped.

PUGET GLACIER

The Puget Glacier, a name we apply to it from the adjacent cape and bay, ends about a mile and a quarter from the head of Puget Bay. (Fig. 2.) This glacier is shown on Tebenkof's map* (1852) and probably also on Vancouver's map, though it is omitted from recent U. S. Coast and Geodetic Survey charts (Nos. 8502 and 8550).

The surface of the upper part of the Puget Glacier is smooth, but about a mile and a half from its end the glacier narrows and for half a mile its surface is steep and much crevassed. It then widens and becomes smooth again, but near its end passes over a cliff, and

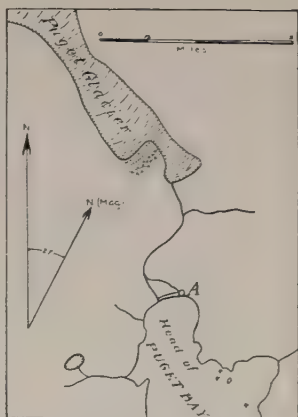


FIG. 2—Map of Puget Glacier, sketched from the head of Puget Bay, July 11, 1909.



FIG. 3—Puget Glacier from Point A of Fig. 2, July 11, 1909.

* Davidson, George, *op. cit.*, p. 20, map 5.

the western side of the glacier ends on the top of this cliff in an ice wall estimated to be 200 feet in height. From this wall blocks of ice fall over the cliff and probably do not consolidate again, although this fact was not conclusively shown from our point of view. The eastern part of the ice stream comes over this cliff in a much crevassed condition and then becomes smoother and deploys towards its end. (Fig. 3.) Beyond the end of the glacier is a considerable bare zone, between which and the sea is a mature forest. The bare zone appears to have been recently occupied by the glacier.

EXCELSIOR GLACIER

The Excelsior Glacier is shown on the earlier maps.* We passed within two miles of the glacier on July 11, 1909. Its front appears to be within half a mile of the sea. On the east is a very large bare zone between the ice and the forest, and on the west there is also a bare zone, but this is not so clearly seen. The glacier ends on a low gravel flat, the central part of which is bare of vegetation. From the appearance of these bare zones it seems that the Excelsior Glacier was considerably larger within a few years and its front may then have reached the sea.

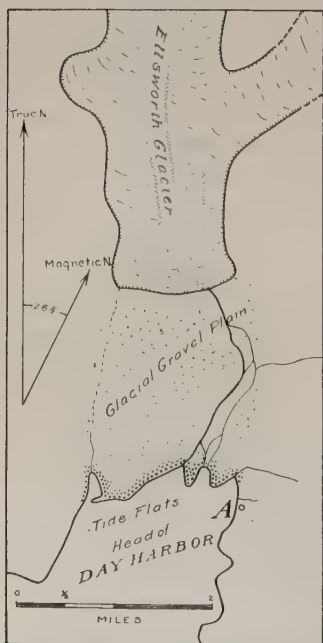


FIG. 4.—Map of Ellsworth Glacier, sketched from the head of Day Harbor, July 12, 1909.

ELLSWORTH GLACIER

The Ellsworth Glacier is situated at the head of Day Harbor, the first bay east of Resurrection Bay. This glacier is not mentioned by Davidson† and evidently did not appear on the maps of Tebenkof and Vancouver. It is shown as reaching tide water on U. S. Coast and Geodetic Chart No. 8502 (1907).

The Ellsworth Glacier (Figs. 4 and 5) is an ice stream of considerable length and low slope. It ends about a mile and three-quarters from tide water. The eastern part of the front is much covered with debris, and the glacier carries four well-marked medial moraines. There are two feeders coming in from the east. About

* Davidson, George, *op. cit.*, p. 20, map 5.

† Davidson, George, *op. cit.*

opposite the upper feeder there is a nunatak which does not rise much above the surface of the ice, and a little south of this feeder and farther west than the other is another nunatak of small size which rises very little above the ice surface. On the west side of the front of the glacier is a bare zone perhaps 200 feet in height, and on the east side of the front is a morainic deposit also bare of vegetation. There are also some morainic hillocks in front of the glacier, and part of the outwash plain is covered by vegetation. We did not



FIG. 5.—Ellsworth Glacier from Point A of Fig. 4, July 12, 1909.

visit the front of the glacier and so have no information as to recent retreat or advance except for the bare zone noted above. It is very improbable that this glacier has reached tide water within a century.

RESURRECTION BAY

Resurrection Bay is the most northerly extending indentation of the coast line of the Gulf of Alaska between Prince William Sound and Cook Inlet. At the head of this bay is the town of Seward, the terminus of the Alaska Northern Railroad and an outfitting point for the gold districts to the north. Seward has a most excellent location on an alluvial fan formed by a stream which comes from the mountains to the west. To the east of the town is the Godwin Glacier, which does not reach sea level; and farther south, on the

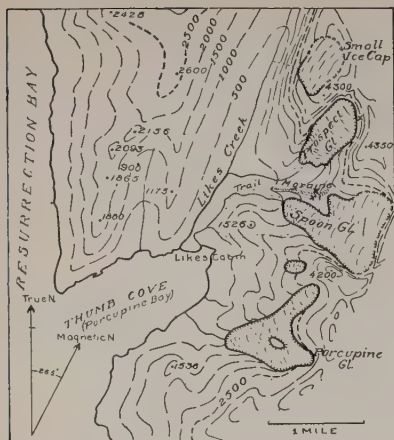


FIG. 6—Sketch map of glaciers east of Thumb Cove, Resurrection Bay, August 21, 1908. Shore line and elevations from U. S. Coast and Geodetic Survey; contour interval 500 feet.

narrow neck of land which separates Resurrection Bay from Day Harbor, are a few small glaciers. The most attractive of these are near the head of Thumb Cove, the largest of the small bays on the east side of Resurrection Bay. These glaciers are shown in the accompanying illustrations (Figs. 6 and 7) and they with the rugged mountain peaks about them form a most picturesque and beautiful scene.

BEAR GLACIER

On the west side of Resurrection Bay, thirteen miles from Seward, is the Bear Glacier, which is the largest ice stream to reach the sea on the Kenai Peninsula. (Figs. 8 and 9.) This glacier is shown on Chart No. 8538 of the United States Coast and Geodetic Survey, and the position of the glacial front in 1909 was essentially the same as when that chart was made (1905). The Bear Glacier has a comparatively low slope and carries two large medial moraines. The gravel flat on which the glacier rests is covered in part by the highest tides, and apparently a combination of highest tide and



FIG. 7—Glaciers east of Thumb Cove, Resurrection Bay, August 21, 1908. At the left is the small ice cap shown in Fig. 6, and to the right of this ice cap are the Prospect, Spoon and Porcupine glaciers. The three peaks in the central half of the photograph are (from left to right) 4,300, 4,350 and 4,200 feet respectively above sea level.

strong southerly wind brings waves over most of this flat. Along the center of the ice front ordinary high tide reaches the glacier. On the east side of the flat is a gravel terrace covered with grass and a few bushes; the terrace at its south end is at high tide level and ascends about 30 feet in going northward a mile. A small remnant of apparently the same terrace occurs on the western part of



FIG. 8—Map of front of Bear Glacier, July 20 and 21, 1909. Occupied points indicated by circles; arrows show directions in which photographs were taken; contour interval 200 feet.

the glacial flat. The terrace probably represents the aggraded surface of the outwash plain when the glacial front stood farther back than at present. On the northeast of the glacial front is a bare rock face about 200 feet high, evidently recently glaciated. South of this is a rocky island in the glacial flat. The northwestern side of the island is bare of timber, and its southeastern side has



FIG. 9—East side of front of the Bear Glacier, from Point A of Fig. 8, July 20, 1909. The terrace is shown at the foot of the hill on the right.

timber. On the west side of the glacier front is a bare zone about 200 feet high and extending a quarter of a mile beyond the ice front. The glacier front thus has been somewhat (perhaps a quarter of a mile) in advance of its present position in comparatively recent years, but has not been farther advanced than the above since the growth of the present forest.

AIALIK BAY

Aialik Bay lies just west of Resurrection Bay. Parts of both sides of the former bay are very irregular, being indented by many approximately semi-circular coves. These represent old glacial cirques which have been drowned in the sea. Towards the upper part of the bay the cirques lie above sea level and near the head of the bay some of these cirques are now occupied by small glaciers. These drowned cirques are also found to the east on Resurrection Bay and to the southwest on Harris Bay and the Pye Islands. (See Fig. 14.)

AIALIK GLACIER

The Aialik Glacier reaches tide water at the west side of the extreme head of Aialik Bay (Fig. 10), whence the name of the glacier. The glacial front is a cliff estimated to be 200 feet in height, and from this cliff ice is being discharged rapidly. There is no medial moraine on the Aialik Glacier, and the lateral moraines, especially the one on the northeast side, are not large. At the center of the front a small mass of rock has just been uncovered by the ice, and there is another small mass just appearing about a third of the way from the center to the north side of the front (Fig. 11). On both sides of the glacier is a marked bare zone, and on the south side in this bare zone is a lateral moraine. When the ice extended out over this bare zone, possibly ten years ago, the front was about a quarter of a mile in advance of its present position. Much earlier (several centuries old) and much more advanced positions of the Aialik Glacier are indicated by shoals, caused by morainic accumulations, across the head of Aialik Bay, opposite and a mile north of the front of the Pedersen Glacier.

PEDERSEN GLACIER

The Pedersen Glacier ends on a gravel flat four miles south of the Aialik Glacier. Toward its end the Pedersen Glacier is smooth, deploys upon a glacial flat, and is reached by high tide along its center (Fig. 10). On the northern side of the front there is a per-



FIG. 10—Map of the upper part of Aialik Bay, July 22–24, 1909. Occupied points are indicated by circles, intersected points by crosses; contour interval 200 feet.

pendicular cliff of ice perhaps 100 feet in height. This glacier also has no medial moraine and has a well-marked bare zone on each side of the front. On the north side this zone is approximately 200 feet in height where it touches the ice, and it extends a third of a mile

east from the present front of the glacier (Fig. 12). Along much of the front a quarter to a third of a mile from the ice are the remains of a low moraine which has now been nearly cut away by the waves. On this moraine are herbaceous plants and some alders about two feet in height. The moraine was probably deposited at the time when the glacier advanced to the edge of the bare zone mentioned above. This advance may have been fifteen years ago and apparently marks the maximum advance of the glacier since the advent of the present forest.

HOLGATE GLACIER

The Holgate Glacier lies at the head of the main westerly branch of Aialik Bay and reaches tide water in two streams separated by a small mass of rock which not many years ago was a nunatak in this glacier. (Fig. 13.) The western and larger stream is discharging rapidly, but the discharge from the southern stream is small. Near the south side of the larger stream is a small medial moraine, but the glacier as a whole is free from medial moraines. The same statement can be made concerning the other glaciers on the west side of Aialik Bay. They all come from an extensive snow field which has few bare peaks rising above its surface. About three-fourths of a mile east of the front of the northern stream of the Holgate Glacier is a rounded reef (Point D, shown in Fig. 10) recently glaciated and now covered by the highest tides. There are no trees on the sides of Holgate Bay within 1.25 miles of its head, and beyond this the forest is sparse. There are no bushes and very few herbaceous plants close to sea level from the glacier to a quarter of a mile east of the reef mentioned above. The rock mass between the two parts of the glacial front has bushes only on its upper half on the front and upper fourth on the sides (Fig. 13). In very recent years then, possibly within the twentieth century, the front of the Holgate Glacier was about a mile in advance of its present (1909) position.

NORTHWESTERN GLACIER

This magnificent glacier (Figs. 14, 15 and 16) reaches the ocean at the head of Harris Bay, the second large bay southwest of Resurrection Bay. The Northwestern is one of the largest ice streams of the Kenai Peninsula and is in full view from the open ocean. This glacier and its surrounding lofty peaks form the most striking scenic feature of the southern shore of the Kenai Peninsula. The Northwestern Glacier, which we named after Northwestern Uni-



FIG. 11—North side of front of the Aialik Glacier, from Point A of Fig. 10, July 23, 1909.
At the extreme left is a mass of rock recently uncovered by the ice;
this rock is in about the center of the glacial front.

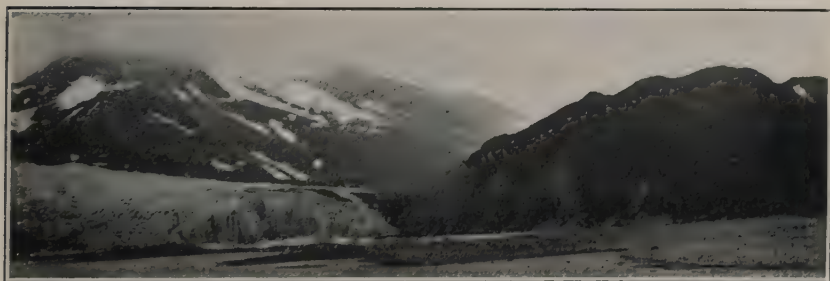


FIG. 12—North side of front of the Pedersen Glacier, from Point B of Fig. 10, July 23, 1909.

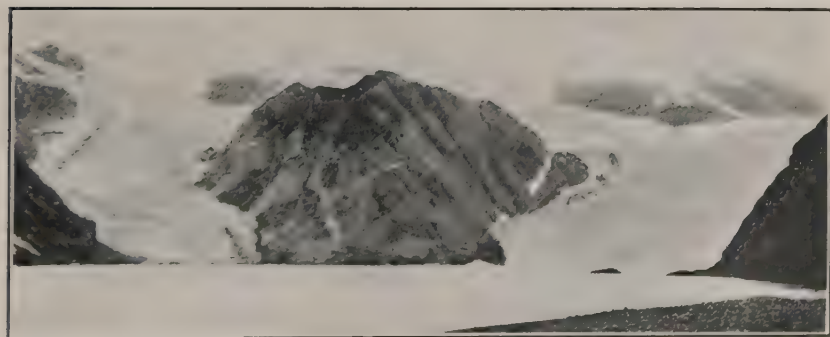


FIG. 13—Front of the Holgate Glacier, from Point C of Fig. 10, July 24, 1909. The small reef in front of the right part of the glacier is Point D of Fig. 10; this reef is now three-fourths of a mile from the ice front, but was covered by the ice possibly within the twentieth century.

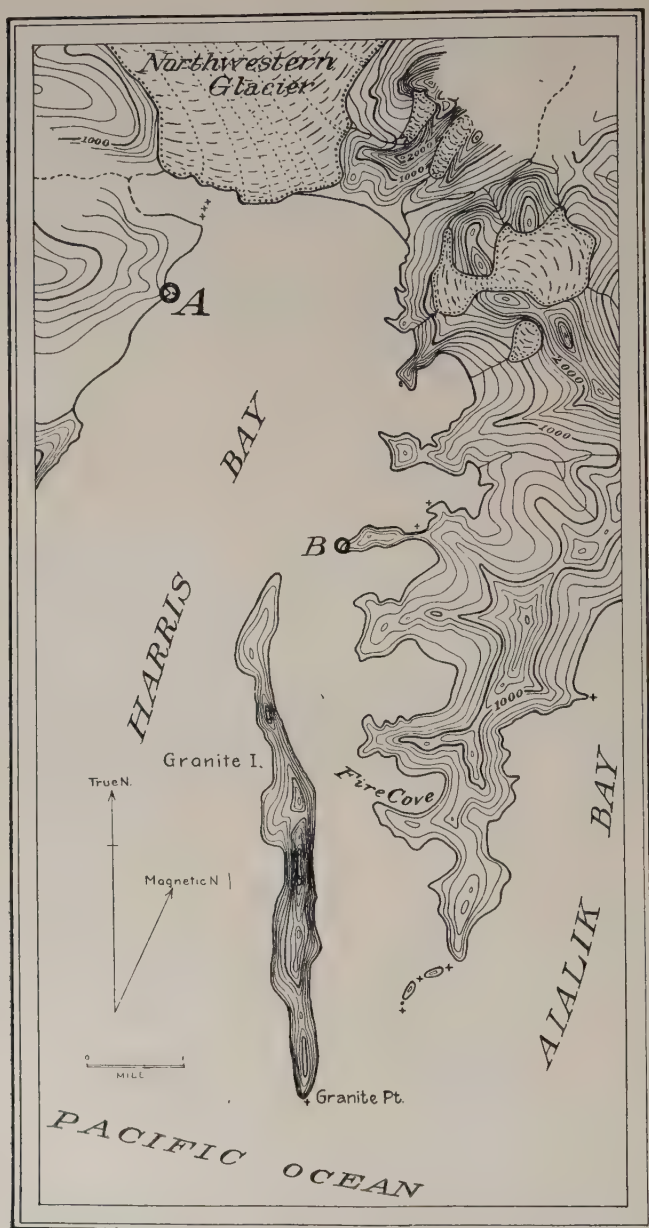


FIG. 14—Sketch map of Harris Bay and Northwestern Glacier, July 27, 1909.
 Contour interval 200 feet. Fire Cove and the adjacent
 similar coves are drowned cirques.

Fig. 15 Eastern part of front of Northwestern Glacier, from Point A of Fig. 14, July 27, 1906. The high peak on the left is the same peak as is shown on the right of Fig. 16.



versity, is shown by Tebenkof, as mentioned by Davidson,* as reaching almost to the sea. We visited this glacier on July 26 and 27, 1909, and examined it from points from one to five miles distant and also from a boat within less than a mile of the glacial front.

The Northwestern Glacier descends from a large ice field to the northeast of Harris Bay. Eight or ten miles from the water several peaks stand out above the edge of this ice field, and from the vicinity of these peaks ice streams descend rapidly to a wide, low valley which the main glacier follows to the sea. The glacial surface carries a number of marked medial moraines, six of which come down to its tide water frontal; at least two others end in the hills to the north. The peaks just mentioned and the medial moraines from them are of reddish granite, and the surface of the glacier is thus striped by bands of a buff color. The west quarter of the front of the glacier forms a steep cliff and is discharging rapidly. The eastern half of the front lies on a gravel flat, the eastern portion of which is not covered by high tide. On both sides of the front there is a bare zone between the glacier and the forest. This zone extends a quarter of a mile beyond the front of the glacier and is estimated to reach 150 feet in height above the



Fig. 16—General view of Northwestern Glacier, from Point B of Fig. 14, July 27, 1909.

* Davidson, George. The glaciers of Alaska that are shown on Russian charts or mentioned in older narratives. *Trans. and Proc. Geog. Soc. of the Pacific*, series 2, vol. 3, 1904, pp. 1-98.

glacier near the front. The front of the Northwestern Glacier is now (1909) about a quarter of a mile from its maximum advance since the growth of the present forest. This maximum position was occupied perhaps 10 to 15 years ago.

NUKA BAY

Nuka Bay is the large inlet lying just west and northwest of the Pye Islands. It has several arms or branches. At the head of the eastern arm is the McCarty Glacier, the most westerly to reach tidewater on the southern shore of the Kenai Peninsula. The Split Glacier ends about two miles from the head of the northern arm. On the southwest shore of the northwest arm are at least four glaciers, but none of them ends near sea level. The western arm (Yalik Bay) has no glaciers draining into it. On the western side of Nuka Bay south of Yalik Bay are two larger glaciers (Yalik and Petrof) and several smaller ones which do not reach the sea but whose waters drain into Nuka Island passage.

MCCARTY GLACIER

The McCarty Glacier reaches the sea at the head of the northeastern arm of Nuka Bay (Figs. 17 and 18). This glacier has a prominent medial moraine in its western half, and this moraine stands up above the ice surface as a ridge. The front of the glacier deploys in semi-circular form on a gravel flat which is mainly above sea level. At the center of its front, however, the glacier reaches tide water and in places presents a steep mural escarpment about 200 feet in height. From this wall ice blocks fall into the water, which is so shallow that the larger bergs do not float away.

On the east of the front of the McCarty Glacier is a broad pitted plain and nearer the ice are morainic ridges which mark an advance



FIG. 17—Map of front of McCarty Glacier, July 30, 1909. Occupied points are indicated by circles, intersected points by crosses; dotted lines at side of glacier indicate limits of bare zone; contour interval 200 feet.

of the ice some years ago. Between the glacier and Delight Lake these morainic ridges reach a height of sixty feet. South of this lake a rock ridge extends westward to within about a quarter of a mile of the glacier. The end of the ridge is of bare rock and has been glaciated up to a height of 250 feet, at which elevation the ice invaded a mature forest and killed many of the trees which are now without bark and are mostly lying on the ground. Among them are live spruces, the largest of which are twelve feet high and six inches in diameter. The advance of the ice which destroyed these larger trees and constructed the morainic ridges just mentioned occurred perhaps fifty years ago and is the extreme advance of the eastern part of the glacier since the growth of the present forest.

The extreme western side of the McCarty Glacier falls abruptly over the point of a rock ridge some 350 feet in height. From the top of this ridge and just west of the ice (Point D of Fig. 17) an excellent view of the glacier and its environs is obtained. Here are two lateral moraines now beyond the edge of the ice. The older and outer of these moraines is not very well defined and varies from a few feet to twelve feet in height. Moss and young spruce trees cover most of the surface of this moraine, and in it are numerous bits of wood and fragments of logs and stumps. Just outside of this moraine (*i. e.*, to the west) is a forest, practically all of whose trees near the ice were killed at apparently the same time that the



FIG. 18.—Central part of front of McCarty Glacier, from Point A of Fig. 17, July 30, 1909.

moraine was formed. These trees are in about the same state of decay as the fragments of trees in the moraine, and they are all in a more advanced stage of decomposition than the trees at any other locality described in this report where forests have been invaded by the ice, excepting the forest destroyed by the maximum advance of the eastern part of the Columbia Glacier. This maximum extent of the western part of the McCarty Glacier probably occurred at the same time as the maximum advance shown on the eastern side of the same glacier.

To the east of the above lateral moraine is another similar, but much younger, moraine. On this there is little moss, but many young spruce trees one to twelve inches high.

THE REAL NEW YORK IN 1910

BY

MARK JEFFERSON

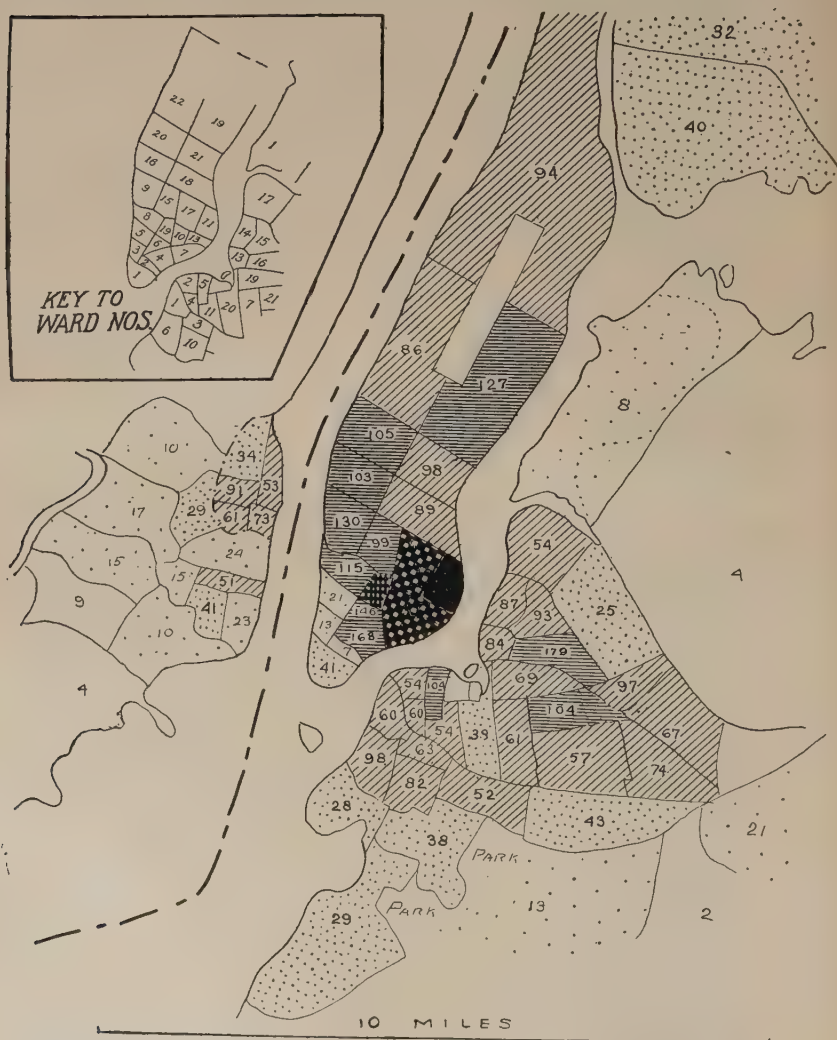
According to the Thirteenth Census, the "city" at the mouth of the Hudson now contains 4,736,000 inhabitants, and 369,000 suburbanites dwell under the same city government with them, the distinction being made that city dwellers inhabit continuous areas every part of which has 10,000 or more people to the square mile. (*Bulletin*, Sept. 1909, p. 544.) All live within the charter limits of New York, Jersey City and Hoboken, making one great group of population about the port.*

Here men dwell closer together than anywhere else in the world, as far as statistics reach. At the time of the Twelfth Census, Ward 10 in Manhattan was thronged with people at the rate of 418,000 to the square mile. That is between the Bowery and Norfolk, Rivington and Division Streets. In the recent decade this has diminished to 386,000, but the density in Ward 11, which lies just east of Tompkins Square, had risen above 446,000. Furthermore, the new enumeration in city blocks shows a third of the blocks in Ward 11 to have more than 500,000 inhabitants to the mile. In fact, it appears probable by studies being made on these data that the five blocks east of Broadway between Delancey and Broome Streets have each more than 600,000 to the mile density.

The map denotes this eastward shifting of the densest population by the black shade of Ward 11. The withdrawing of the popu-

* If Newark were included in the group, the numbers would become 5,044,444 and 409,000.

lation eastward into the "heel" of Manhattan's well-filled stocking is accompanied by a simultaneous vacating of the "toe." Ward 2, south of the Brooklyn Bridge and west of Fulton Market, had 1,488 inhabitants in 1900 and has now but 933. Its density of population, therefore, has dropped from 12,000 per square mile to 7,000. The ward now has less than "city" density! Not, of course, that it has in any sense become suburban; on the contrary, it has taken on a



Sketch Map of the Density of Population of the "Anthropographic" City of New York. Scale 1:180,000 approx. Figures denote density of population in thousands to the square mile. [Ward 19 on Key Map, lying south of Ward 15, should read 14.]

special character met with only in the heart of great cities, where public and office buildings replace dwellings on land too costly to use for residence. Precisely its location in the midst of a great group of people has given this high value that drives residents away. Manhattan's case is the most extreme known, as the concentration of business there is enormous. The famous illustration in London, The City, has still the very considerable density of 18,000 per square mile in its thinnest borough, All Hallows, Barking. Yet the greatest density in the closer settled region about was 204,000 at Stepney. New York had 418,000 in Ward 10 and close by.

The adjoining Fifth Ward has also lost many people. Further up the island at West 33rd Street, 16,500 people have been displaced during the decade to make room for the new Pennsylvania Railroad Terminal station. "Five blocks were cut out, with 500 city homes." So there, too, the population density has fallen from 129,000 to 105,000. Ward 18 in Manhattan catches the eye as less thickly settled than its neighborhood, but four parks count in its area:—Madison Square, Gramercy, Union Square and Stuyvesant. If settled about as neighboring areas they would bring the density up a little above 100,000 per mile. Mulberry Bend Park in Ward 6 reminds us of Mr. Riis's battle with the slums and an intentional reduction of density.

In Brooklyn the central wards 2, 3 and 11 have lost people to the total amount of nearly 5,000. On the other hand, the suburban Ward 29, "Flatbush," has come up from 27,188 to 73,048. In 1900 its density was 5,000 per square mile. It is now 13,000.

In Queens, which was all suburban in 1900, most of Ward 1 is now urban. The density is 8,000, but it is due to unoccupied land at the extremities of the ward rather than to thinness of the whole. For this reason it has been included in the anthropographic city.

The suburban parts of the metropolis are therefore:—all of Richmond Borough (Staten Island), 85,969 people; all but the First Ward of Queens, on Long Island, 222,278 people; Wards 31 and 32 in Brooklyn, Gravesend and Flatlands, with 38,022 people; in all, for political New York, 346,269 suburbanites. In Jersey City, Ward 7 has 22,616 suburban people. Hoboken has none. The totals for 1910 are:

	OFFICIAL.	ANTHROPOGRAPHIC.
New York.....	4,767,000	4,421,000
Jersey City.....	268,000	245,000
Hoboken.....	70,000	70,000
	5,105,000	4,736,000*

* Newark has Wards 8 and 12 suburban, with 39,895 inhabitants. Its figures are 347,000 and 307,000. If added to the above they give 5,452,000 and 5,043,000.

If the above figures be compared with those of 1900 (*Sept. Bull.* 1909), it is seen that proportionally as well as actually the greatest growth is in Greater New York, which grew 40 per cent. Jersey City grew 24 per cent. and Hoboken 18 per cent. At Brooklyn in the interval the anthropographic city added 504,487 to its inhabitants, a growth of 46 per cent. Manhattan added 481,449 or 27 per cent. Henceforth, therefore, the main growth is to be looked for across the East River. A comparison of the densities mapped with those of 1900 will disclose how far this has already proceeded.

By 1920 the "city" at the Hudson mouth will certainly contain more than 6,000,000 inhabitants. Its present growth is about 133,000 annually. For the next five years it should have:—

1910.....	4,736,000	1913.....	5,135,000
1911.....	4,869,000	1914.....	5,278,000
1912.....	5,002,000	1915.....	5,411,000

THE PURPOSE AND POSITION OF GEOGRAPHY*

BY

COLONEL C. F. CLOSE, C.M.G., R.E.

I propose to devote the first part of this address to an examination of the purpose and position of Geography, with special reference to its relations with other subjects. It will not be possible entirely to avoid controversial matters; but, if some of the questions touched on are controversial, this only means that these questions have a certain importance. I shall try to describe the facts of the case impartially.

In the second part I shall try to indicate briefly what the Government, as represented by the great Department of State, is doing for Geography.

PART I.—THE POSITION OF GEOGRAPHY WITH REFERENCE TO OTHER SUBJECTS

It is no secret that the geographical world is not unanimous about the meaning and object of Geography. The definitions suggested by such writers as Mr. Chisholm, Professor Davis, Professor Herbert-

* Presidential Address to the Geographical Section of the British Association, Portsmouth, England, August, 1911.

son, Mr. Mackinder, or Dr. Mill, are not in agreement. From time to time an attempt is made to formulate some statement which shall not commit the subscribers to anything very definite. But differences of opinion on the subject persist.

There are, of course, a great many ways of approaching the question. Let us, for example, examine the proceedings of such representative bodies as the British Association and the Royal Geographical Society, and of such assemblies as the International Geographical Congresses, and let us see if we can find out what is, as a fact, the scope of the subject as dealt with by these bodies. They are institutions which work in the full light of day, and they are too large to be dominated for any length of time by individuals. If we can find any working principle, any common term, amongst these societies, we shall have gone some way towards arriving at a solution of the problem.

A simple method of investigation is to discuss the character of the publications of these societies and of the lectures delivered before them. And I feel that I cannot do better than devote most of this brief analysis to the Royal Geographical Society and its admirably edited Journal. Here we are on safe ground. If an inhabitant of another planet wished to know what we understand by astronomy we could confidently refer him to the Monthly Notices of the Royal Astronomical Society. If he were curious about the condition of geology, we should give him the volumes of the Geological Society. And, if he were so rash as to ask what are the objects of the modern mathematician, we should hand him the papers published by the London Mathematical Society. The "Geographical Journal" occupies no lower a position with reference to Geography than do the other journals mentioned with reference to the sciences with which they deal.

In analyzing the contributions to the Royal Geographical Society it is important to start with an honest classification. In the endeavor to be impartial I have chosen the classification which was adopted for the last International Geographical Congress, *i. e.*, that held at Geneva in 1908. This Congress was divided into fourteen sections. It will serve to clear the ground if we deal first with sections 12, 13, and 14; these are the Teaching of Geography, Historical Geography (which was mainly concerned with the history of travel and exploration), and Rules and Nomenclature. For the purpose of discovering what Geography is these three sections will not be of any assistance. Every subject has its educational side, its history, and its rules and nomenclature. The subject proper was,

therefore, divided into eleven sections. The eleven sections are the following:

1. Mathematical and Cartographical Geography.
2. General Physical Geography.
3. Vulcanology and Seismology.
4. Glaciers.
5. Hydrography (Potamography and Limnology).
6. Oceanography.
7. Meteorology and Climatology; Terrestrial Magnetism.
8. Biological Geography.
9. Anthropology and Ethnography.
10. Economic and Social Geography.
11. Explorations.

Before applying this classification to the work of the Geographical Society I wish to call attention to the extremely frank way in which vulcanology, seismology, meteorology, climatology, terrestrial magnetism, anthropology, and ethnography, are included in Geography. The list in fact covers ground occupied by several sections of the British Association.

I have investigated the work of the Geographical Society for the five complete years 1906 to 1910. The original contributions to the "Geographical Journal" have been examined for that period, omitting from consideration contributions on the subjects of teaching, the history of exploration, and rules and nomenclature.

There are altogether 296 original papers which come under one or another of the eleven headings given above. Of these papers, 171, or 57 per cent., deal with Explorations and Travels. There is a great drop to the next largest section, General Physical Geography, which accounts for thirty papers, or about 10 per cent. Adhering to the order of the Geneva Congress the complete list is as follows:

ORIGINAL CONTRIBUTIONS TO THE PROCEEDINGS OF THE ROYAL
GEOGRAPHICAL SOCIETY DURING THE FIVE YEARS 1906 TO 1910

SUBJECT	PERCENTAGE
1. Mathematical and Cartographical Geography.....	3
2. General Physical Geography	10
3. Vulcanology and Seismology	5
4. Glaciers	3
5. Hydrography (Potamography and Limnology)....	5
6. Oceanography	3
7. Meteorology and Climatology; Terrestrial Magnetism	3

SUBJECT	PERCENTAGE
8. Biological Geography	1
9. Anthropology and Ethnography	3
10. Economic and Social Geography.....	7
11. Explorations	57

The main conclusion is obvious enough. For the principal Geographical Society in the world, Geography is still mainly an affair of explorations and surveys; if to this item we add cartography we account for 60 per cent. of the activities of the Society.

There is another important deduction which is natural and unforced: the papers on vulcanology and seismology and on glaciers could have been read with perfect appropriateness before the Geological Society; those on meteorology and climatology before the Meteorological Society; and those on anthropology and ethnography before the Anthropological Society. To make quite sure of this point I will cite a few title of the papers read: "The great Tarawera Volcanic Rift," by J. M. Bell; "Recent Earthquakes," by R. D. Oldham; "Glacial History of Western Europe," by Professor T. G. Bonney; "Climatic Features of the Pleistocene Ice-Age," by Professor A. Penck; "Rainfall of British East Africa," by G. B. Williams; "Geographical Distribution of Rainfall in the British Isles," by Dr. H. R. Mill; "Geographical Conditions affecting Population in the East Mediterranean Lands," by D. G. Hogarth; "Tribes of North-Western Se-Chuan," by W. N. Fergusson.

This little list of typical subjects indicates clearly that there is a large group of contributions which would have found an appropriate home in the journals of the Geological, Meteorological, and Anthropological Societies; there is a possible corollary that, since men who make a life study of these subjects are best capable of dealing with them, the authors of the above type of paper who submit their work to the Geographical Society, in so doing appeal rather to the public at large than to men of their own special sciences.

We may therefore sum up the results of this brief investigation into the work of the Royal Geographical Society by saying that 60 per cent. of it is concerned with exploration and mapping, and that some of the remainder could be dealt with appropriately by the learned societies concerned, but that the Geographical Society serves as a popularizing medium. It also serves a useful purpose as a common meeting-ground for vulcanologists, seismologists, oceanographers, meteorologists, climatologists, anthropologists, and ethnographers.

Another line of investigation may be profitably pursued. Who are, by common consent, the leading geographers of the world? No doubt the explorers come first in popular estimation, such men (omitting British names) as Peary, Charcot, Sven Hedin. Then after this type would come the men of learning who stand out in any International Congress. These men stand out because they have, by their own exertions, increased the sum of human knowledge. Omitting for the moment the consideration of exploration and mapping, we find that in an international congress a large number of the most celebrated geographers are eminent as geologists. In such a gathering we can also pick out those who have advanced the sciences of meteorology or anthropology. Now let us suppose the position reversed. Let the functions of geology be supposed to be somewhat in dispute and those of geography perfectly definite, and further let us suppose that at an international meeting of geologists a large proportion of the men of real distinction were geographers. We may in this way get an idea of what geography looks like from the outside.

I think that at this point we may explain, in a preliminary way, the work of the Geographical societies, after the fashion of the "Child's Guide to Knowledge":

Question: What is Geography?

Answer: There is no generally accepted definition of Geography.

Question: Can we not form some idea of the scope of the subject by considering the work of the Royal Geographical Society?

Answer: Yes; 60 per cent. of this work deals with explorations, surveys, and mapping, and of the rest a considerable portion consists of matter which could be discussed appropriately before the Geological, Meteorological, and Anthropological Societies.

Question: What, then, leaving maps out of consideration, are the useful functions of a Geographical society?

Answer: A Geographical society serves to popularize the work of men who labor in certain fields of science, and such a society forms a very convenient meeting-ground for them.

Question: What is a geographer?

Answer: The term geographer is sometimes applied to explorers; sometimes to men who compile books derived mainly from the labors of surveyors, geodesists, geologists, climatologists, ethnographers and others; sometimes to those who compile distributional maps.

Question: Can a geographer who has not made a special study of one or more of such subjects as geodesy, surveying, cartography, geology, climatology, or ethnography, hope to advance human knowledge?

Answer: He can do much to popularize these subjects, but he cannot hope to do original work.

Another way of attempting to ascertain the meaning and object of Geography is to study the character of the instruction given in

the universities, and we may suppose that this can be fairly judged by the contents of standard text-books. Let us take, for example, the "*Traité de Géographie Physique*" of M. E. de Martonne, formerly Professor of Geography at the University of Lyons, now Professor at the Sorbonne. The work in question was published in 1909 and is divided into four main sections—Climate, Hydrography, Terrestrial Relief, and Biogeography.

The first sentence of the book is "What is Geography?" Twenty-four pages are devoted to discussing this question, which the writer, with all his skill and learning, finds it difficult to answer definitely and convincingly. One receives the impression of the dexterous handling of a difficult question, and of a generally defensive attitude. In this book geography is said to depend on three principles. The principle of *extension*, the principle of *co-ordination*, and the principle of *causality*. As an illustration of the meaning of the principle of extension, we are told that "the botanist who studies the organs of a plant, its conditions of life, its position in classification, is not doing geographical work; but if he seeks to determine its area of extension, *il fait de la géographie botanique*." I believe that we have here reached a critical point. The claim is, that when, in the prosecution of a botanical study, a map is used to show the distribution of a plant, the use of such a map converts the study into a branch of geography. Well, it is a question of definition and convention, which cannot, I imagine, be settled except by the general agreement of all the sciences. We have to make up our minds whether a man who constructs a distributional map is doing "geography." One thing, I suppose, is not doubtful. When the map is made it will be better interpreted by a botanist than by a person ignorant of botany. In the same way the discussion of an ordinary geological map is best undertaken by a geologist, and so on. It would appear that geography, in the sense mentioned, is not so much a subject as a method of research.

It will be convenient here to say a few words about the relations between societies and schools of Geography and those two important subjects geodesy and geology. Curiously enough, there is not, and has never been, in the United Kingdom a society or body specially charged with the study of geodesy. Geodesy, in fact, has no regular home in these islands. But the Royal Geographical Society has done a good deal in the past few years to stimulate an interest in the subject, thereby fulfilling what I believe to be one of the Society's most useful functions, that of popularization.

If, however, an authoritative opinion were required on any geo-

detic question, where could it be obtained? Well, I suppose there is no doubt that the headquarters of this branch of learning is the International Geodetic Association, but the scientific work itself is being largely carried out at the Geodetic Institute at Potsdam, by the Survey of India, by the Geodetic Section of the Service Géographique, by the U. S. Coast and Geodetic Survey, and by similar bodies. Geodesy, especially in its later developments, is a definitely scientific subject which demands much study and application. It is but slightly touched upon by the schools of Geography. Perhaps I may here point out that geodesy is by no means mainly concerned with the shape of the spheroid. The chief problems are now those of isostasy and local attraction generally, the real shape of the sea-surface, the continuity of the crust of the earth and changes of density therein.

The position in which Geography finds itself with regard to Geology can be clearly seen if reference is made to the new edition of the "Encyclopædia Britannica." In the eleventh volume of this work are two important articles, "Geography," by Dr. H. R. Mill, and "Geology," by Sir Archibald Geikie. In the article on "Geography" we find a description of geomorphology as that part of Geography which deals with terrestrial relief, and a remark is made that "opinion still differs as to the extent to which the geographer's work should overlap that of the geologist." In this article, however, most of the authorities quoted are geologists, and the author remarks that "the geographers who have hitherto given most attention to the forms of the land have been trained as geologists."

Turning to the article on "Geology" we find an important section on "Physiographical Geology," which is described as dealing with the investigation of "the origin and history of the present topographical features of the land." Now this is the exact field claimed for geomorphology. It has been observed by others, notably by Professor de Martonne, that the interpretation of topographic forms has been most successfully undertaken by geologists, and he gives as an instance of this the good work done by the United States Geological Survey.

I do not know whether any geographer untrained as a geologist has contributed anything of value to geomorphology.

Another test which may be applied is the following: Let us imagine Geography to be non-existent and note what the effect would be. Suppose there were no such things as Government Geographical Services, or Schools of Geography at the Universities, or Geographical Societies. The first and most obvious result would be that

most, if not all, of our apparatus of exploration and mapping would have disappeared. But as we are all in agreement as to the necessity of this branch of human effort, let us restore this to existence and examine the effect of the disappearance of the rest.

So far as concerns geodesy, we should still possess the International Geodetic Association, the Geodetic Institute at Potsdam, and the United States Geodetic Survey, and similar bodies. But we should have lost the means of popularizing geodesy in the proceedings of Geographical Societies; and, as there would be now no geographical text-books, elementary geodesy would not find itself between the same covers as climatology and geomorphology.

As regards geomorphology, or physiographical geology, not very much difference would be noted. The geologists would still pursue this important subject; but here again their writings would perhaps appeal to a more expert and less popular audience; although it is not to be forgotten that many admirable introductions to the subject have been written by geologists.

Much the same might be said about meteorology and climatology. There would be text-books devoted to these studies, but there might be a diminution of popular interest.

Such names as phyto-geography would disappear, but the study of botany (if we permit it the use of distributional maps) would not be affected. The loss to knowledge would be mainly that of getting to a certain extent out of touch with the public. The constitutions of the various learned bodies would remain the same and so would their functions. The constitution of the Royal Society, which has never recognized geography as a subject, would be totally unaffected.

If we thus study the relations between Geography and other subjects we are almost bound to arrive at the conclusion that Geography is not a unit of science in the sense in which geology, astronomy, or chemistry are units. If we inquire into the current teaching of Geography, and examine modern text-books, we find that most of the matter is derived directly from the workers in other fields of study. And if we inquire into the products of Geographical societies, it becomes evident that one of the most important functions fulfilled by these useful bodies is to popularize the work of geodesists, geologists, climatologists, and others, and to provide a common meeting ground for them. If Geography had been able to include geology and the other sciences which deal with earth-knowledge, it would then, indeed, have been a master science. But things have worked out differently.

I shall very probably be told that, in laying some stress on the above-mentioned aspects of the subject, I have forgotten that the main purpose of Geography is the study of the earth as the home of man, or the study of man as affected by his environment, and that, however necessary it may be to begin with a foundation of geodesy, geology, and climatology, we must have as our main structure the investigation of the effect of place conditions on the races of man, on human history and human industry, on economics and politics.

It is obviously and abundantly true that no student of history, economics, or politics can disregard the effect of geographical environment. But it is not, as a fact, disregarded by writers on these subjects. The question is, to a large extent, whether we should annex these portions of their studies, group them and label them "Geography." Our right to do this will depend on the value of our own original investigations. We have the right to use the results obtained by others, provided that we add something valuable of our own.

Before this human aspect of geography—or, for that matter, any other aspect of the subject—is recognized by the world of science as an independent, indispensable, and definite branch of knowledge, it must prove its independence and value by original, definite, and if possible, quantitative research.

PART II.—GEOGRAPHY AND THE GOVERNMENT DEPARTMENTS

Whatever definition of Geography is accepted we are all in agreement that the map is the essential foundation of the subject. I propose now to indicate very briefly how the British Government, as represented by the great Departments of State, is, in this respect, assisting the cause of Geography. The Departments which are interested in maps and surveys are the following:—The Admiralty, the War Office, the Colonial Office, the India Office, the Board of Agriculture, and the Foreign Office.

The immense services rendered, not only to this country, but to the whole world, by the Hydrographic Department of the Admiralty, are known to all. But it would be somewhat rash for a soldier to talk about hydrographic surveys, so I will confine my remarks to surveys on land.

First it should be remarked that the British Government as a whole has for many years shown its interest in Geography, and has recognized the good work done by the Royal Géographical Society by contributing an annual sum of 500*l.* towards the funds of the

Society. Next it should be noted that from time to time British Governments have contributed large sums of money towards Arctic and Antarctic exploration. The most recent examples of this very practical form of encouragement will be remembered by all; I mean the Government expenditure on Scott's first Antarctic Expedition and the handsome sum contributed towards the cost of Shackleton's great journey.

Turning now to the War Office, the first matter to which I would call attention is that nearly all the accurate topographical surveys of the Empire have been started by soldiers. This applies to the United Kingdom, Canada, Australia, South Africa, Tropical Africa, and last, but greatest of all, India. The accounts of the struggles of soldiers at the end of the eighteenth century to obtain sanction for what is now known as the Ordnance Survey form very interesting reading. In fact, all over the world it was military requirements which produced the topographical map; and it is still the War Offices of the world which control the execution of almost all geographically important surveys. During the last few years the largest block of work undertaken by the War Office has been the accurate survey of the Orange Free State, which has an area of about 52,000 square miles—nearly the size of England—and an adjacent reconnaissance survey in the Cape of Good Hope covering an area of a hundred thousand square miles. There has been some inevitable delay (due to causes which need not be gone into now) in the publication of the sheets of this survey, but the work is being pushed on. The survey of the Orange Free State is fully comparable with the admirable surveys carried out by the French Service Géographique de l'Armée in Algeria and Tunis. Some work has also been done in the Transvaal. Other surveys carried out in recent years under the direct control of the War Office are those of Mauritius, St. Helena, a portion of Sierra Leone, Malta, and Hong Kong. The most notable work which is now being carried out in the Self-Governing Dominions is the Militia Department Survey of Canada, with which excellent progress has been made.

The total area of the Crown Colonies and Protectorates, under the rule of the Colonial Office, amounts to about two million square miles. British African Protectorates form a large portion of this total, and I will indicate briefly what is being done to survey these tropical Protectorates. From the geographical point of view the brightest regions are East Africa, Uganda, and Southern Nigeria. In East Africa topographical surveys of the highlands and coast belt are being pushed on by military parties as part of the local survey

department. The area of exact work done amounts now to some 30,000 square miles. In Uganda a military party has recently completed a large block of country, and in this Protectorate thoroughly reliable maps of 32,000 square miles are now available. In Southern Nigeria a completely reorganized survey department is tackling in a thoroughly systematic fashion the difficult task of mapping a forest-clad country. We shall shortly see the results.

For the information of those who have not travelled in Tropical Africa it should be remarked that surveying in such countries is attended by every sort of difficulty and discomfort, and too often by illness and serious discouragement. It is one thing to sit at home in a comfortable office and plan a scheme of survey, and quite another thing to carry it out on the spot. We do not, I am convinced, give enough honor and credit to those who actually get the work done in such trying circumstances. Honest accurate survey work in the tropics puts a much greater strain on a man than exploratory sketching. To picture what the conditions are, imagine that you are to make a half-inch survey of the South of England; cover the whole country with dense forest; put mangrove swamps up all the estuaries; raise the temperature to that of a hot-house; introduce all manner of insects; fill the country with malaria, yellow fever, blackwater fever, and sleeping sickness; let some of your staff be sick; then have a fight with the local treasury as to some necessary payment, and be as cheerful as you can. That is one side of the medal. On the other side there is the abiding interest which the surveyor feels in the country, the natives, and the work; the sense of duty done; and the satisfaction of opening up and mapping for the first time a portion of this world's surface.

There is no time to mention other surveys in Africa, and I will pass on to a very interesting part of the world, the Federated Malay States. In this prosperous country much excellent geographical work is being done by the combined survey department which was established under a Surveyor-General in the year 1907. The department is in good hands, and the commencement of a regular topographical series is being undertaken.

I wish it were possible to prophesy smooth things about Ceylon. From our special point of view the situation leaves much to be desired. There is not yet published a single topographical map, and the topographical surveys are progressing at a rate which, under favorable conditions, may result in the maps being completed in the year 1970.

In closing this inadequate review of the principal surveys which

are being undertaken in the Crown Colonies and Protectorates, I should mention that the co-ordinating factor is the Colonial Survey Committee, which every year publishes a report which is presented to Parliament.

The India Office is of course concerned with that great department the Survey of India. The Indian Empire has an area of about 1,800,000 square miles, and as, under the arrangements approved in 1908, the standard scale of survey is to be one inch to one mile, the area of paper to be covered will be 1,800,000 square inches. Actually this is divided into about 6,700 sheets. The Survey of India has always been famous for its geodetic work and for its frontier surveys and methods. Its weak point used to be its map reproduction. This has been greatly improved. But personally I feel that if, for most military and popular purposes, a half-inch map is found suitable for England, as is undoubtedly the case, there is no reason why a half-inch map should not also be suitable for India. It is mainly a question of putting more information on the published map, and of engraving it and using finer means of reproduction. If this smaller scale were adopted all the information now presented could be shown, and the number of the sheets would be reduced from 6,700 to 1,675, a saving of 5,000 sheets. It is difficult to avoid the feeling that the Survey of India is over-weighted with the present scheme. The scheme has, however, many merits. It will be impossible to carry it out unless the department is kept at full strength.

The Board of Agriculture is the Department which is charged with the administration of the Ordnance Survey. The Ordnance Survey spends some £200,000 a year, and for that sum it furnishes the inhabitants of the United Kingdom with what are, without doubt, the finest and most complete series of large-scale maps which any country possesses. There is nothing in any important country (such as France, Germany, Italy, Russia, or the United States) to compare with our complete and uniform series of sheets on the scale of $\frac{1}{250,000}$. These sheets are sold at a nominal price and are in effect a free gift to landowners, agents, and all who deal with real property. They are also, of course, invaluable to country and borough engineers and surveyors. They really are a national asset which is not half enough appreciated. The whole conception of these large-scale plans has stood the test of time and is greatly to the honor of a former generation of officers.

Much might be said about the small-scale maps of the Ordnance Survey, which are now published in a very convenient form. As mentioned below, the latest small-scale Ordnance map is the new

International Map on the million scale. Some sheets of this map will shortly be published.

The Foreign Office is concerned with the surveys of the Anglo-Egyptian Sudan, which are at present mainly of an exploratory character. The taking over of the Province of Lado has recently thrown fresh work on the Sudan Survey Department. The Foreign Office, which administers Zanzibar, has recently given orders for the survey of the Island of Pemba, a dependency of Zanzibar, and this is being carried out by a small military party.

But the greatest service to Geography rendered by the Foreign Office in recent years was the encouragement given to the project of the International Map by the assembly of an international committee in November 1909. Sir Charles, now Lord, Hardinge presided at the opening session. There were delegates from Austria-Hungary, France, Germany, Great Britain, Canada and Australia, Italy, Russia, Spain and the United States, and, as is known, the resolutions which were devised by the Committee were agreed to unanimously. After the conclusion of the work of the Committee the Government communicated the resolutions to all countries which had not been represented, and nearly all the replies which have been received are favorable. Maps in exact accordance with the resolutions are, it is understood, being produced by France, Hungary, Italy, Spain, the United States, and other countries, and so far as we are concerned, by the General Staff, the Ordnance Survey, and India. These maps will be shown at the International Geographical Congress which meets at Rome in October next.

I have now come to the end of this rapid sketch of the geographical work of the official world. It is work which, though often of an apparently humdrum character, outweighs in importance the sum total of all which can by any possibility be undertaken by private agency or by societies. But it is the very legitimate business of societies to criticize and encourage.

It is, in fact, not only our manifest duty to encourage the systematic mapping of the world on which we live, but we should do all we can to ensure the perfection, and suitability for their special purposes, of the maps themselves. In the surveying of the earth's surface and its representation by means of maps we are treating of matters which are essentially and peculiarly our own.

It would appear that another great function of Geography, as represented by Geographical societies and congresses, is to serve as a popularizing medium for such sciences as geodesy, geology, climatology, and anthropology, and also to serve as the means of bringing

together the workers in these sciences. We may be told that so far as this Association is concerned the exact study of geodesy and meteorology is dealt with by Section A, geology by Section C, and anthropology by Section H, but there is, I believe, no other section which forms a more convenient general meeting-ground for all the workers in the various divisions of earth-knowledge. We ourselves have our own special work, work which is shared by no others, the great task of mapping the world. This task is such a necessary one, and it is of such genuine value to so many studies, that by assisting in it we are really furthering the Advancement of Science, which is the object of this great Association.

FOUNDATIONS OF ECONOMIC PROGRESS IN TROPICAL AFRICA*

BY

CYRUS C. ADAMS

Thirty-five years ago, we knew practically nothing of tropical Africa, more than ten or twelve miles inland, excepting along a few great rivers and the other routes of pioneer explorers. European traders had few direct relations with the east coast. The western shores were more easily accessible and here were many white men at their stations near the river mouths, engaged in a thriving barter trade. But they did not go inland. Sierra Leone has been a crown colony of the United Kingdom for more than a century, but, twenty-five years ago, its Hinterland was geographically unknown.† European enterprise was content to hug the coast though much trade came to it from the interior. Catholic missionaries at Gaboon and Landana, when asked why they did not extend their work into the interior, said they had no resources for traveling inland.‡ On the broad estuary of the Congo it was thought phenomenal if traders ever ventured as far as the Yellala Falls, some

* Read at Clark University in the Conference upon "The Near East and Africa," October, 1910. Reprinted from *The Journal of Race Development*. Clark University, vol. 2, no. 1, July, 1911.

† "A Transformed Colony." Sierra Leone as it was and as it is, etc. By T. J. Alldridge. J. B. Lippincott Company, Philadelphia, 1910. p. 17.

‡ *La Revue Congolaise*, vol. 1, no. 2, 1910, Brussels. p. 179.

ninety-five miles from the mouth of the river. Trading stations were sometimes attacked and many were kept on a war-footing.

The modern transformation began in 1879 when Stanley was sent by the African International Association, with King Leopold at its head, to make a practical study of the Congo plateau, above the 235 miles of cataracts, for purposes of possession and exploitation. In the following year, Brazza ascended the Ogowe River, making treaties with the chiefs and starting the foundation of the French Congo. This was the initiation of the partition of tropical Africa among the colonial powers of Europe. To this appropriation of the greater part of the second largest continent was given some semblance of formality by over 2,000 treaties to which the marks of as many important chiefs were affixed.

Each of five densely peopled and prosperous countries of Europe eagerly sought all it could get of these new lands.* Each wanted colonies (1) as sources of supply of foodstuffs and of raw materials for the industrial enterprises of the mother land; (2) as reliable, oversea markets for home manufactures; (3) as possible, ultimate areas of settlement for superfluity of the home population. We know to-day that, in the first two respects, the acquirement of tropical African colonies by European powers will be a most profitable investment; and that the third ambition, to secure lands where many of the home people may begin life anew under the flag of their fathers, will be realized to a small extent.

The evidence is now ample to justify these great enterprises in Africa. Germany has observed that the total export and import trade of her once decried colony of German East Africa with about 10,000,000 population amounted, in 1908, to \$10,000,000; and that in the same year, the value of her total trade relations with China, with over 300,000,000 population, was also \$10,000,000. We may safely say that, on the whole, the desirable results, both material and humanitarian, of this mighty colonial movement, in the first thirty years of its existence, have far surpassed expectations; that tropical Africa seems destined permanently to contribute far more to the wealth of the world than, in our ignorance, we dared to expect; that the good in African peoples which Livingstone claimed for them, exists and is being developed; and that the vast white spaces on the maps of a generation ago, are found to be filled with potentialities that will give wide influence, a great future to tropical Africa.

The seven colonial powers in tropical Africa finally found them-

* Belgium, France, Germany, Great Britain, Italy.

selves in possession of about 7,088,000 square miles of territory, an area more than twice as large as that of the United States. Scarcely a square mile had been surveyed. There were no maps to give intelligent direction to effort. Almost nothing was known of the climatic variations over this vast expanse, of the hydrographic régime, of the distribution of forests, grazing lands, minerals and other resources. Could the whites so far master problems of tropical hygiene that they might sojourn there in a fair state of strength? Would the natives work for them? Hundreds of questions such as these were constantly arising and they had to be answered. There could be little economic development unless they were answered. The attempt will be made here to show some of the facilities which the whites are providing for their work, the partial solution of their problems, and the material progress now manifest as the result of long experience and study.

Exploration, in detail, has made wonderful progress, but its completion, in so vast an area, will require many future decades. By the collaboration of many hundreds of officials and specially detailed or independent observers, a good working knowledge, however, has been obtained of large and very numerous districts which are most conveniently situated for early development. Some of these districts embrace the most of whole colonies or protectorates as Togo, Sierra Leone, and French West Africa; but we should add that in each of these districts there may be large areas, of forests, for example, that have not yet been explored.

These studies, on the whole, cover the ground that should always be covered by those who come after the pioneer explorer; in other words, a large proportion of the published results are the work of expert investigators, put in the field by governments, societies, or companies who require reliable data. The topics treated embrace all phases of tropical Africa that are of special interest now, in the work of development, including tropical hygiene. A considerable number of monographs and books which embody the essence of all that has been learned in one or another field of study are constantly appearing. As an illustration, we may cite the Austrian botanist, Franz Thonner, who has published a work of 673 pages and 150 plates describing all the species of flowering plants that are now known in Africa and its islands. Of course, the great variety and the volume of carefully collected information, now in print, is invaluable for the manifold enterprises under development.

It may be very trite to say that "Maps are a short cut to geographical knowledge;" but, in our country, where there is little gen-

eral appreciation of the great helpfulness of good maps, the idea seems to require iteration. The leaders in the movement to transform tropical Africa realized that it would be worth all it might cost to produce good maps of the new possessions. The result is that, for more than a quarter of a century there has been incessant pushing of surveys and map-making; so that, to-day, we may get a good idea, from maps, of the distribution of the natural and cultural features of tropical Africa including, on many maps of fairly large scale, a great deal of detailed information. Of course, these maps are not all of equal value; many of them are based merely upon reconnaissance surveys; but, fortunately, so many astronomical points have now been fixed throughout tropical Africa that it is very often convenient to tie to them surveys of all kinds for map-making purposes. Most of the frontiers of the African colonies have now been surveyed and delimited, which is very helpful to other mapping, because they supply so many fixed points of latitude and longitude.

The many scores of survey parties, whether for boundary or other purposes, have contributed very largely to our knowledge because many of them were explicitly instructed carefully to collect and record all the information they could gather about the geography, the rock formations, the vegetation, the peoples, resources, etc., of the countries through which they passed. The German report on the joint British-German survey for the delimitation of the boundary between Victoria Nyanza and Kilimanjaro was a delight to those who appreciate definite, reliable information about new lands. The governor-general of the vast French Congo declared a year ago, that the reports on itinerary surveys were too summary to be of the highest usefulness in completing the map of the colony; and he issued an order that survey parties should collect and coördinate series of facts relating to geology, hydrology, meteorology, ethnography, botany, statistics, etc., all of which, as he said, are of prime importance in the development of the French Congo.

This supplementary idea has been added to most of the schemes of map-making. Hundreds of map sheets, therefore, give a good, general idea of the nature of the economic development for which each region mapped seems best adapted. These maps, accordingly, are of prime importance in the shaping of new enterprises.

The many maps which the French have produced in the Sahara are topographical itineraries, with astronomical points fixed so that there has been large rectification of positions assigned by the earlier explorers to oases, wells, settlements and routes. Trigonometrical

surveys have also been made of important oases. Some grazing areas and cultivable lands have been discovered and outlined in the middle and south of the Sahara. Few military expeditions have been richer in geographical results than that which the French have recently led against the warrior class who preyed upon the pastoral people of Mauritania. A map was constructed of the whole area traversed, so that another white space in Africa has been filled with map detail. The British have shown in Kordofan that, though the best maps must be based upon triangulation, still a map may be made that is most useful and informing, though not strictly accurate from a cartographic standpoint.

In a concise reference to the mapping of tropical Africa, which is of great importance in development work, only a few of the most conspicuous features can be mentioned. Dr. Gruner has said of the fine ten-sheet map of Togo, on a scale of 1:2,000,000, or 3.1 statute miles to an inch, that even on this comparatively large scale it was impossible to show all the accurate topographic detail collected. This map was in preparation for about ten years; and, as in all the German maps based upon detailed surveys, accurately determined data are carefully differentiated from less exact information, by the color scheme and other devices.

The Togo map and the other German maps of large parts of German East and Southwest Africa and the Cameroons are among the very best products of the kind that have ever been made in new lands. They give an incomparably more accurate idea of the regions they represent than we could possibly derive from any map of the western part of the Balkan Peninsula, published thirty years ago. The official German Colonial Atlas, printed in 1897, is so completely out of date, that new sheets are being issued embracing the large amount of cartographic material now available.

The French map product also maintains a high standard. The sheets, in colors, of the colonies, on which the Colonial Office has generalized the enormous amount of survey material collected, are among the best maps of recently explored parts of the world. Both the British and French governments are also issuing map sheets on a scale of 1:1,000,000, containing the results of the latest information on the areas covered.

Comparatively little new map work has been done in the Portuguese and Spanish territories; and it must suffice here merely to refer to the very serviceable cartographic output of the Belgian Congo and other colonies. The present status of map work has made possible, within the past few years, the production of good

economic maps showing climatic and topographic variations, the distribution of great forests, swamps, dry areas, plains, highlands, minerals and other export products, the extent of navigation, etc. All these maps are preliminary and incomplete, but they represent the great progress in our knowledge of Africa; and about 100 new map sheets are issued every year to supplement and improve them. Though Africa is the last of the continents to be opened to enterprise, this great event has occurred in an era that in many ways, and not least in the production of good maps, is facilitating more rapid development than was possible in any other of the continents.

As in surveys and map-making, so also in railroad construction and telegraph installation, tropical Africa, in the space of twenty-five years, has far surpassed the record of any other new land in the same length of time. The impossibility of developing the colonies without bringing the great interior areas of production into close relations with the sea by means of railroads was recognized from the first; and a large amount of government and private capital has been invested in these enterprises. Some of them, most notably the Congo Railroad, in the lower cataract region, have, from the first, paid all charges and substantial dividends. Most of them have paid all working expenses and a part of the interest on their obligations. Their record, in these initial days of colonial production, is of splendid augury for their future success.

Reference can be made here only to some of the more important rail routes. The Cape to Cairo Railroad has advanced from Cape Town across the Zambesi at Victoria Falls to Broken Hill, the present terminus of the main line. A branch line to the northwest is now in operation to the copper field of Katanga (Belgian Congo), so that there is continuous rail connection from Cape Town over 2,100 miles north. The northern section is now completed to Senaar, on the Blue Nile. On the way south, it will circumvent the swamp region of the White Nile. The whole line (Cape to Cairo) will be about 6,870 miles long and about three-fourths of the distance is now covered by steam routes, rail or river.

The Belgian Railroad Company of the Great Lakes is just completing its rail routes around the cataracts and rapids of the Upper Congo, so that there will now be uninterrupted steam transportation by water or land, for about 2,250 miles from the mouth of the river to Kalengwe Falls, the extreme limit of navigation. A railroad is to be built from these Falls to southern Katanga. This mining region will therefore have steam connections with the sea, both at Cape Town, at the mouth of the Congo and at Beira, in Portuguese

East Africa. Some progress has also been made in the construction of the railroad which will ultimately connect Benguela, the Angola seaport on the Atlantic with the mineral region of south Katanga.

The foreign trade of the Nyasaland Protectorate has been hampered by the fact that the Shire River is impassable for most craft during the dry months, (April-December). This impediment has now been obviated by a railroad in operation between Port Herald and Blantyre, the capital of the Protectorate.

Speke was about a year and Stanley eight months in reaching Victoria Nyanza from the Indian Ocean. A governor of German East Africa has now left his capital at Dar es Salaam, traveled by steamer to Mombasa, thence by the Uganda Railroad to Victoria Nyanza, then by steamer around the entire coast, stopping at every German station and in Uganda, and back to his capital, about a month after he left it.

The upper and middle Niger is now connected at three points with the sea by steam transportation. The French are running trains from Kayes, the head of navigation, on the Senegal River, to Bamako on the Niger, connecting with the little steamers for Timbuktu, on the edge of the Sahara; so that the time from Timbuktu to France, if close connections are made, is nineteen days. The Senegal, however, in the dry season is not navigable. The French are therefore constructing a railroad from Dakar, their leading port in Senegal, to Kayes, in order to secure uninterrupted steam service between the Atlantic and Timbuktu. The same government has completed a railroad across its colony of French Guinea from Konakry, the chief port, to Kurussa on the Upper Niger, and have thus two steam routes to that river. The third railroad to the Niger, further south, is a British enterprise, now in operation between Lagos and Jebba, with results so remarkable that if the figures for the last three months, of 1910, correspond with those of the previous nine months, the receipts for that year will be about \$500,000 over and above the operating expenses. It will take some time to bridge the Niger at Jebba, but the railroad is advancing rapidly beyond the river and it will be completed in less than three years to Kano, the leading commercial center of the Central Sudan, and will pass through the great cotton area of Northern Nigeria; with a branch running to Bauchi, now said to be one of the greatest future sources of the world's tin supply.

The native labor question involves perplexities, but it is moving towards solution. Nearly all of tropical Africa is for the blacks, not for white colonists. The natives themselves must supply the manual

labor which development requires. The whites will direct the important enterprises, but unless the native furnishes the brawn and sinew, the work will not be done. So the colonial policies have long been formulating around the idea that the negro is essential to prosperity, an indispensable constituent in the agencies of wealth production and that all efforts to build up thriving colonies without him will fail.

The labor question has been much obscured by writers who have drawn sweeping deductions from what they have seen in very limited areas. Many natives are not yet willing to work longer than is necessary to procure the few things they wish to buy. Some West African merchants, one day, thought they would stimulate rubber production by offering a higher price for it. To their surprise, the supply fell off. The natives found that at the higher price, they could satisfy their immediate wants by sending less rubber to market. Many such instances have been used to fortify the idea that the native African will not work unless you flog him to his task. This is an untenable proposition. The British know it and their laws rigidly forbid any form of enforced native labor in their African territory. The Germans have learned it and the early proposal to establish forced labor in German East Africa has never been carried out. There are many tribes such as the Wakikuyu, of the British East Africa highlands, who are, persistently, hard workers. A little familiarity with the idea that hard work will bring more comfort has turned tens of thousands of natives to habits of industry. When the Congo enterprise began, Stanley could not induce the natives to work for him. He sent to Zanzibar and to Liberia for labor. But before the railroad was built around the Congo cataracts, 40,000 of these Congo men were in the portage service. About 4,000 of the Congoese have long been at work building the stretches of railroad around sections of the upper river rapids. They have not only graded the roadbed and laid the rails, but they have also burned lime and made brick and built the stations along the new route; for one of the prominent purposes of the whole colonial régime in tropical Africa is to give industrial education to many natives so that they may better help themselves and render more effective service to the whites. Both governments and missionary societies are enlisted in this work and nowhere with better results than in the Belgian Congo, where these trained blacks are not only locomotive firemen but engineers as well; where they partly man the government printing office and have become good carpenters, cabinet makers and masons; and native tailoresses make garments

on sewing machines for the thousands of black police, soldiery and workmen.

The Handbook of the Nyasaland Protectorate says that native labor is plentiful, except in the rainy season, when the people are busy on their farmlands, and will work freely for the whites only at higher wages. In some of the colonies the natives are developing an ambition to till land for the profit they can make from the sale of their products. In 1908, the tribes near Victoria Nyanza sold for export over the Uganda Railroad, 1412 tons of grain, 1207 tons of potatoes and pineapples, and 359 tons of beans; and their sales in each line of farm products are increasing every year by hundreds of tons. We may cite another still more striking instance from the Gold Coast, West Africa. Only a few years ago, cacao was experimentally raised in the Botanical Gardens, and eighty pounds were exported, the first export from that colony of the commodity that gives us chocolate and cocoa. In 1907, the exports were 21,000,000 pounds and every pound was the product of native agriculture. The feeling is now strong that in British West Africa, as far as agriculture is concerned, the best line of development will be in the encouragement and training of the native farmer.

It may be long before the average native attains his best efficiency as farmer or wage earner, but the tendency, on the whole, is towards improvement. The main fact is that throughout the colonies, the black man is selling to the whites a tremendous total of manual service, and more of it every year; in addition, he pays a tax to help support the government under which he lives. In his report for 1909, Mr. Swann, of the Nyasaland Protectorate, says that the native tax, in only one of his collection districts, yielded \$125,000 in that year. In some colonies, the natives complain that they are not getting sufficient return for the tax they pay. In the French Congo, the annual tax is \$1 per individual, and the Catholic missionaries say that the government is doing nothing to improve navigation or the native roads to markets and is leaving the support of schools and hospitals entirely to the missions. On the whole, however, the white governments, including the French colonies, are carrying out wisely devised plans for native education, elementary of course, and particularly strong along industrial lines.

Such unspeakable outrages upon the natives as those in the Abir and one or two other rubber concessions in the Belgian Congo, are a thing of the past. To the concessionary companies was given, stupidly or wickedly, not only the exploitation of rubber in the fields assigned to them, but also absolute control over the black population

in the conceded territories, regardless of the laws of the Congo State, which, if enforced, were ample for native protection. We have heard of the remarkable fortunes of the little island of São Thomé in the Gulf of Guinea, 31 miles long and 19 miles wide, whose cacao exports, in ten years, have amounted to \$68,000,000; and that this story of the wonderful bounty of São Thomé is marred by the fact that the labor recruiting system of Portuguese Angola practically reduces the men and women who work on these island plantations to a state of slavery. We hear now that the Portuguese law of July 17, 1909, is expected to end this disgraceful condition.

We may expect soon to be able to hear over-night from Timbuktu, on the southern Saharan edge. The whole world is now in touch with the Congo, the great lakes, the Zambesi River, by telegraph. Tropical Africa is being brought nearer and nearer to the civilized nations and it is becoming more and more difficult to subject natives to a policy of systematic abuse without arousing protests that will be effective.

While tropical Africa can never become a home for millions of the white race, there are a few areas where good lands stand so high above the sea that temperate influences prevail. To these regions white immigration is already invited, to some extent, and they are destined to become the homes of many thousands of white toilers whose enterprises will include the raising of European cereals, good cattle and good breeds of sheep both for meat and wool. These lands include a large area in British East Africa where the plain gradually and steadily rises inland, as it does from Omaha to the Rocky Mountains, so that, at Nairobi, 327 miles from the port of Mombasa, the elevation is 5,450 feet above the sea, in the Kikuya country to the north and west, from 4,500 to 6,500 feet, and west of the Mau Escarpment from 6,000 to nearly 8,000 feet. On this high plateau of British East Africa, white settlers, stock-raisers and farmers have already taken up over 1,000,000 acres, much of it divided into large ranches, though there are a considerable number of small farmers. This great region adapted for white laborers includes some of the expansive game reserves where, under the law, game cannot be hunted except by special permit, which is seldom granted. The whites say, that on account of the enormous quantity of big game, they find it almost impossible to maintain fences; also that where millions of antelopes, zebras and other grazing animals can fatten on these wide grass lands, great numbers of cattle and sheep would thrive. There is a general feeling that the government should cease to extend its protection over game in immense regions that are cap-

able of development. Colonel Sir James Sadler, governor of the colony, said in a recent speech that game preservation must not be permitted to impede the development of the country by white settlers and that changes in the game laws in this particular were under consideration.

German East Africa has a fine section of these fertile highlands in the neighborhood of Mounts Kilimanjaro and Meru, where many German, Greek and other peasants are already settled and also several hundred Boers from the Transvaal. These Boers, like their fathers, are skilful and hardy pioneers. They have introduced the ox-wagon into the colony. Most of them are living on the extensive grass plains of the Meru district. The more well-to-do have covered considerable areas with maize, beans, wheat, white potatoes, fruits and vegetables and also comparatively large cattle and sheep raising. Others farm on a smaller scale with a few score of cattle and 200 or 300 sheep. Ostrich farming has begun, alfalfa is one of the new crops and beef is preserved for home consumption by drying.

Another splendid area in German East Africa for future European settlement is the high plateau of Ruanda in the northwest corner of the colony. The government has not yet organized this province.

The area which the Belgian Congo offers to white settlers comprises about 40,000,000 acres in High Katanga, between 10 degrees S. Lat. and the southern and eastern frontiers of the colony. The land is about 4,900 feet above the sea, with a mild and salubrious climate closely resembling that of Southern Rhodesia, where white settlers are constantly arriving. This area is in the highly mineralized part of Katanga, and the agricultural opportunities are probably inferior to those of the other tropical highlands; but white colonists are now moving into this region. The largest number of white settlers in any of the new colonies will probably be found, ultimately, in the southern part of German Southwest Africa, but this region is south of the southern tropic. No common man is fitted for the tremendous work of taming these wildernesses. The pioneer must have the sternest qualities, the greatest fortitude and endurance. No ordinary immigrant is accepted by the governments inviting immigration. The settler, also, while liberally assisted by government, must go provided with some means of his own.

But what of the thousands of white men who must live under intense tropical conditions, planning every phase of the material evolution of these countries and of the training of the negro for the most effective service? We may say, at least, that the terrible mor-

tality that accompanied the initiation of this work is not witnessed to-day. The great progress in the study of tropical hygiene, the abolition, for the most part, of tinned foods, the supply at most stations of fresh meat and of European vegetables, the accessibility of medical attendance, the care that is widely taken to provide the whites with spacious, well-ventilated houses, with ample shade, vegetable and flower gardens, bath houses in many cases, books and papers, and in other ways to minister to their comfort and well-being—all these influences have helped greatly to decrease the death rate; so that it is now reasonable to expect that a strong, healthy man may maintain fair health and energy for his two or three years of enlistment and that, after a good rest in a milder climate, he will return to the work with new vigor.

The material results of all this exploration, experimentation and study have been very great; and greater still, the countless lessons learned that will go very far to give the right impetus, the proper direction and the efficient method in all the future work. In view of the facts that the governmental régime had to be organized and the plant provided from the ground up, while, at the same time, a vast amount of exploration and of fundamental development work was carried on and is still in progress, it is not surprising that government expenditures still exceed the revenues; but the disparity between them is decreasing. I may here give a fact or two indicative of the trend of the commercial movement. The following import figures do not include imports for government purposes but only foreign commodities sold to the population. The export figures wholly represent colonial products sold in foreign markets.

The imports of the little Togo colony of Germany in 1898 were worth \$757,000; in 1908, \$2,127,000.

The exports of Togo, in 1898 were worth \$503,900; in 1908, \$1,703,000.

The imports of German East Africa in 1898 were worth \$4,213,000; in 1908, \$6,446,000; exports in 1898, \$1,498,000; in 1908, \$2,718,000.*

It was announced in 1899, that Uganda was just beginning to have a little foreign trade, but I have seen no statistics for that year. In 1908, the imports were worth \$1,855,000; exports \$735,000, and this in the midst of the terrible sleeping sickness.

* The total import and export trade of French West Africa doubled in the ten years ending in 1908. *Statist. du Commerce des Colonies Françaises, pour l'Année 1908, Tome premier, Paris, 1910, p. 108.* The imports of the five colonies constituting French West Africa, amounted in 1908 to \$21,718,093; exports \$18,500,189.

The imports of the six British West African colonies in 1904 were valued at \$28,690,000; in 1908, \$37,595,000. Exports in 1904, \$25,330,000; in 1908, \$35,225,000.

We may refer briefly to some other facts momentous in their bearing upon the future economic value of tropical Africa.

It may surprise many to know that European vegetables are successfully grown, especially at altitudes of 1,000 feet or more. It has taken time to learn just when to plant and how to care for them; but nearly all of our garden truck grows well in most parts of tropical Africa, even in the clearings of the Great Forest where government posts are established.*

Africa is without doubt a source of maize for European consumption. It is one of the new export crops. A shipload of it was taken from British East Africa in the fall of 1910. It is already exported in considerable quantities from the colonies north of the Gulf of Guinea.

The Handbook of Nyasaland, says that pears, peaches and possibly plums seem likely to succeed above 3,000 feet of elevation, if carefully attended.

Twelve years ago the European powers began anxiously to scan the colonial field, for regions under their flags that would supply them with cotton. There is no doubt to-day that Africa is a great future reserve for cotton. A large part of British East Africa is well adapted for this crop. In Nyasaland, American upland is a commercial success and is the variety now recommended. German East Africa, which has large areas adapted for cotton, is now importing seed from American upland grown in Nyasaland as the plant thrives better there than that from seed imported from our country. Large tracts are under cotton culture in Uganda. The natives have taken kindly to the industry, and without European supervision are preparing the land, sowing the seed, and bringing a raw material to market that for length of staple and general quality compares favorably with any cotton in the world. In 1908, four years after the first experimental efforts, the Uganda crop was sold for \$250,000. In West Africa, the cotton product of Togo, in 1909, showed an increase of 32 per cent. over the previous year. The experts who for some years have been studying the prospects of cotton in Northern Nigeria, assert that there are 24,000,000 acres in the colony which will grow the quality of fiber that Lancashire requires. If this is correct, Nigeria has three-fourths as much land adapted for cotton raising as the United States devoted to that crop in 1909.

Sisal hemp, of which Yucatan is now the greatest source of sup-

* In Commandant Delhaise's "*Les Warega*" (XX and 376 pp., Albert De Wit, Brussels, 1900), the author gives an interesting account of clearings in the great tropical forest in the eastern part of the Belgian Congo, where the soil is well adapted for the production of many crops, and European vegetables of all kinds are raised at the colonial stations.

ply, is doing so well in German East Africa that the planters complain that the facilities for shipping their fiber from the important port of Tanga, are inadequate. Wheat is growing in the highlands of Angola, British East Africa, and in Angoni Land (Nyasaland), and it is estimated that tropical Africa will produce enough wheat for all the whites living in that region. Rice in several of the West Africa colonies is declared to be fully equal if not superior to the Bengal article.

For ten years the best breeds of European cattle have been taken to Africa for the improvement of the native cattle, with the result that in some tropical regions more milk and better beef per animal is now attained; but, on the whole, the experiment has not been very successful, for the mixed breeds are quite susceptible to disease. It is so important, however, that these food resources should be in adequate supply for the whites that the experiments are continued. One of the latest phases is the importation of a breed of Zebu cattle from India, famous both for milk and meat, to cross with the native stock. Millions of sheep will be raised among the highlands of tropical Africa, for wool as well as for meat. The experiments with wool sheep on the high plateaus of British East Africa, have been most encouraging for the future of the industry.*

The study given in the past thirty years to the question of the capacity of tropical Africa, to add largely to the wealth of the world, and thereby enhance her own well-being, has conclusively proven that this vast region has enormous resources of great variety that only await exploitation; and that the tremendous outlay of brain and capital that is now and will be invested in the work of development will not be able, for generations to come, even to arrest the loss of natural wealth that cannot now be garnered. The total of essences, oils, forest growths, etc., that decay and perish every year for lack of care or collection, will long continue to exceed in amount the value of all the industrial enterprises now opening.

* A very encouraging view of the wool industry in the British East Africa Protectorate is given by Major Schlobach in the *Deutsche Kolonialzeitung*, vol. 27, July, 1910, pp. 500-2. He says that the crossing of Shropshire or Lincoln sheep from England with the South African merino has proven very successful on these highlands of British East Africa; also that sheep from Cape Colony, imported into British East Africa, are yielding heavier fleeces than in their native home.

DAYLIGHT OBSERVATIONS ON VENUS

BY

J. P. AULT

One day during the summer of 1908, while on a magnetic surveying trip in northern Canada, I was lying back in the canoe as we were sailing across one of the numerous lakes of that region, and gazing up into the brilliant blue of the sky, when suddenly I was astonished to find my attention fixed by a very bright star shining in the western heavens. Never before had I seen Venus with the unaided eye in bright sunlight, and it appeared so brilliant and so prominent that, with a little directing, it was soon located by all the members of the party.

As I had had some experience in navigation, the star's brightness and visibility at once impressed me with its possible use as an object for observation, in connection with observations on the sun, to determine the position of a ship at sea. Since that time I have been curious to know how generally it is in use by mariners and what is the accuracy of the results obtained with an ordinary sextant under the conditions that usually prevail for daylight observations at sea.

As magnetic observer and navigating officer on board the *Carnegie*, the Magnetic Survey Yacht of the Carnegie Institution of Washington, on her first cruise on the North Atlantic during 1909-1910, the opportunity came to me to try observing Venus by daylight. Observations for latitude were made on ten days at about 3 o'clock in the afternoon, with Venus on the meridian, in connection with observations on the sun for longitude. On two days observations were made at noon for longitude, in connection with observations on the sun for latitude. Also observations were usually made on two or more stars both in the morning and in the evening, so that we were able to determine very closely the accuracy of the results obtained from observations on Venus.

In observing on Venus the usual instruments and methods were employed that were used in making observations on the sun. The ordinary sun eye-piece was used in the sextant and all observations were made on the open bridge. In locating the star for the first time its approximate position with reference to the sun was found from the Nautical Almanac, and it was then very easily located with

the naked eye. Instead of "bringing the star down" to the horizon, as is usually done with the sun, the method generally employed with stars was used, namely: Hold the sextant inverted in the left hand, then direct the eye-piece toward the star, and with the right hand "bring the horizon up" to the star by moving the index arm until the star and the horizon appear in the field of view together; then clamp the index arm and taking the sextant in the right hand as usual, direct it toward the horizon where the star will appear in position for observation. Or, when observing for latitude with Venus on the meridian, the sextant may be set to the proper reading by computing the approximate meridian altitude of the star from its declination and the latitude, which is known approximately, and then by sweeping the horizon to the south or north, as the case may be, the star will be located very easily.

The observations were usually made by two and sometimes by three observers, and the results never differed by more than 0.5 of arc and usually agreed within 0.1. On one day a fourth observer, who was not experienced in the use of the sextant, measured the meridian altitude of Venus, and his result differed by only 0.7 of arc from the mean of the other results. So it is not a question of any particular skill or of any unusual atmospheric conditions, but merely requires a little patience and confidence and a normally clear atmosphere.

In the table of results is included the meteorological and other information usually noted when any astronomical observations were made. In determining the accuracy of the results obtained, the position as given by the Venus sight is compared with a mean position which depends upon observations made both before and after the Venus observations. In the case of the latitude the noon value resulting from observations on the sun is reckoned ahead to the time of the Venus sight, and the latitude resulting from observations on two or more stars in the evening is reckoned back to the time of the Venus sight, and the mean of these two reckoned results is compared with the value from Venus. On Dec. 9 this "dead-reckoning" had to be carried over a much longer interval, from star sights on the previous evening ahead to Venus, a period of twenty-two hours, and from sun observations at noon on the following day, back to Venus, a period of over twenty hours, differing by 4.0 from the Venus value. This of course cannot be compared with the other results in the last column which depend upon dead-reckoning over a much shorter interval. In the case of the longitude the result from Venus is compared with a value which is the mean of the morning

DAYLIGHT OBSERVATIONS ON VENUS.
FIRST CRUISE OF THE "CARNEGIE," 1909-1910.

OBSERVATIONS FOR LATITUDE.

DATE 1909.	LATITUDE NORTH.	LONGITUDE WEST.	LOCAL APPARENT TIME.	WIND.		TEMPERATURE.		BARO- METER.	ATTACHED THER- MOMETER.	HORI- ZON.	LATITUDE RECKONED.		LATITUDE BY VEPUS.	DIFFERENCE MEAN— VENUS.	REMARKS.
				Direction	Force	Air	Water				From Noon	From P.M. Stars			
Dec. 9	21	34	10	S S E	0-1	44.0 C	23.8 C	30.10	78 F	Good	20 58.0*	21 06.7†	21 06.4	(-4.0)	* Reckoned from P.M. star sights on previous day, 22 hours earlier. † Reckoned from noon on following day, 20 1/2 hours later.
14	20	42	06	N N E	1	44.0	23.0	30.08	75	Good	20 26.0	20 02.0	20 03.4	20 03.6	
16	20	46	03	N N E	3	37.7	25.0	30.10	76	Good	20 04.0	20 03.0	20 03.2	-0.2	
17	20	47	40	N W	2	27.2	25.8	30.16	78	Rolling	20 02.6	19 41.9	19 40.4	-0.3	
21	19	40	20	S E	2	26.0	25.0	30.26	80	Good	19 57.3	19 50.0	19 50.7	-1.1	
23	20	51	41	S E	3	26.0	24.9	30.17	79	Rough	21 39.6	21 40.6	21 40.1	-0.7	
26	21	41	55	S E	3	25.2	23.7	30.20	79	Good	24 04.5	24 05.0	24 04.4	-0.5	
29	24	59	40	S S W	5	25.0	23.7	30.10	78	Good	24 28.8	24 25.8	24 24.9	0.0	
30 Jan. 3	25	62	03	N E	1	18.5	20.3	30.44	71	Good	28 09.0	28 09.0	28 09.0	0.0	
	28	66	57										Means	0.7	Omitting first.
	09													0.5	and second.

(* and † apply to Dec. 9 value only.)

OBSERVATIONS FOR LONGITUDE.

DATE 1909.	LATITUDE NORTH.	LONGITUDE WEST.	LOCAL APPARENT TIME.	WIND.		TEMPERATURE.		BARO- METER.	ATTACHED THER- MOMETER.	HORI- ZON.	LONGITUDE RECKONED.		MEAN.	LONGITUDE BY VENUS.	DIFFERENCE MEAN— VENUS.
				Direction	Force	Air.	Water.				From A.M. Sun	From P.M. Sun			
Dec. 18	20	01	48	Calm	0	29.0 C	25.0 C	30.17	80 F	Good	48 01.1	66 48.3	48 01.1	48 01.6	-0.5
1910 Jan. 3	28	03	66	N E	2	18.8	20.0	30.46	69	Good	66 47.5	66 48.3	66 47.9	66 48.5	-0.6

sun observations, reckoned ahead to noon, and of the afternoon sun observations, reckoned back to noon when the Venus observations were taken.

In the last column, omitting the first result because of the long interval over which the dead-reckoning had to be carried, the mean of the results is only 0.7 of arc, and if we omit the second result, where no stars were observed in the evening, the mean is only 0.5 of arc. When it is noted that while at sea the *Carnegie* is strictly a sailing vessel, using her auxiliary power only when becalmed, it is readily seen that the uncertainty in the steering, the difficulty in properly estimating the leeway and the effect of unknown currents, all tend to decrease the accuracy of the dead-reckoning. In view of this uncertainty the fact that the results from Venus differ in the mean from the value obtained by dead-reckoning by only from 0.5 to 0.7 of arc certainly indicates that uniformly good results can be obtained.

To the average mariner star sights appear difficult and more or less to be viewed with suspicion, but this really is due to a lack of familiarity with the operations involved, since they are no more difficult or complicated than for sun observations. The novelty of observing a star by daylight adds enough interest to the work of the navigator to warrant the undertaking of the operation without any further inducement, but there is added to this at least two opportunities for an accurate determination of the ship's position entirely independent of the operation of dead-reckoning.

It might be of interest to note the result of star observations with the sextant, using the sea horizon by moonlight. As the *Carnegie* lay at anchor off Funchal, Madeira, on Nov. 27, 1909, just one-half mile due south of a longitude station, the opportunity was taken to observe stars one night to determine the error of our chronometers. It was a bright moonlight night and the horizon was well defined. Altair was observed to the west and α Ceti to the east, and the results from the two stars differed by only 0.1 second of time. The chronometer correction obtained differed from the accumulated correction, carried ahead from Falmouth time ball observations on November 9, by only 0.2 second of time.

DEPARTMENT OF TERRESTRIAL MAGNETISM,
CARNEGIE INSTITUTION OF WASHINGTON, WASHINGTON, D. C.

STEFÁNSSON AND ANDERSON IN THE CANADIAN ARCTIC

The Society has received the following information from Mr. V. Stefánsson from the mouth of Dease River (Great Bear Lake, Canada), dated Oct. 20, 1910:

"It is now well along in the third year since we came here on what was to be a three years' undertaking at the most. We have covered the ground and done our work, though it remains to be seen if we have done it well. We have been on the Colville and Coppermine Rivers and secured the main *desideratum* of the expedition by discovering groups of people whose ancestors, and they themselves, had never seen a white man—nor an Indian for that matter. We found house-ruins here and there from Cape Lyon to Inman's River where our only predecessor, Dr. Richardson, found none; we have seen Eskimo camps scattered over the whole area between Dease River, the Coppermine River and Great Bear Lake and learned that it has been so since before the memory of anyone now living. This will, I think, surprise geographers as it completely surprised me; neither did we expect to find settlements on the mainland west of Cape Krusenstern, but we found a village of over forty houses as far west as Cape Bexley and evidences of people west beyond Point Wise. No man west of Cape Krusenstern had ever seen a white man; only one group west of the Coppermine (that at Rae River) had ever been visited by a white man, and only one man of those who saw Dr. Richardson and Dr. Rae is now living. No one had heard of Collinson's ship passing through the Straits [north of the Canadian mainland]. No one saw Amundsen's ship as it sailed west, either from the continental or the Victoria Land shore. Once, many years ago, a party that went west along the coast 'a long way,' saw a three-masted ship far out at sea. This party promptly fled inland and did not return to the coast until autumn. The ship must have been a whaler, and none of the natives were seen from it.

"Our most interesting discovery—if not the most important—was the finding of European-looking people on the south coast of Victoria Island north of Cape Bexley. I learned from Capt. Klinkenberg at Herschel Island in 1906 and from Capt. Mogg at Cape Halkett in 1908 that they had seen Eskimos near Minto Inlet who were fairer of complexion than any they had previously seen. Both captains had been commanders of the schooner *Olga* which wintered north of Prince Albert Sound in 1905-6 and again 1907-8, the only ship to visit Victoria Island since Collinson almost 60 years before. We found the group we visited (about 40 persons, of whom I saw 17) to differ strikingly from any Eskimos I have either seen or heard of. They looked more like a crew of whalers dressed in Eskimo garb than like Eskimos. This struck my native companions no less forcibly than me; one of them, who has worked aboard a whaler for more than ten years, said: 'They are not Eskimos; they are foc's'le men.'

"The finding of these Eskimos is either the beginning of the solution of one of two old problems, or else it is a new problem in the geography and ethno-

logy of the Arctic. The old problems are (a) what became of some of Franklin's men and (b) what became of the 3,000 Icelandic Scandinavians who disappeared from Greenland in the fifteenth century? But if it shall appear that the new facts have no bearing on either of these Arctic tragedies, the explanation that suggests itself is that the original Eskimo type more nearly resembled that of Europe than has been suspected and that here, in the most isolated section of the Eskimo territory, we have that type preserved in comparative purity. There remains the possibility that their environment may have caused these isolated people to vary from the parent type along a line tending towards the European, but this seems to me the least likely of all the available explanations. Whatever may be the ultimate scientific verdict, I am sure that anyone familiar with other Eskimos, and not oppressed with scientific caution, would say on seeing some of these people that they are three-quarters European. I personally have seen some forty Eskimos of various ages who are known to have European fathers, and out of the whole forty one could not pick out two that are as European in type as two of the seventeen Victoria Island men (*Ha-ner-ág-mi-ūt* they call themselves) whom we visited in May last. Although their hair was no lighter than dark-brown, three had light beards (two of them would be fairly called red) and all had light eyebrows; one man had dark brown curly hair much resembling Eskimo half-bloods I have seen whose fathers were natives of the Cape Verde Islands or Portugal."

After his northern exploration in Victoria Island, Stefánsson reached the Coppermine River on June 2 last year and found the English travelers Melville and Hornby on Sept. 13 who told him of Peary's attainment of the North Pole.

"Upper Dease River, Nov. 3, 1910. This letter was begun at the winter camp of the English travelers Melville and Hornby near old Fort Confidence [on the northeast coast of Great Bear Lake] whose ruins still call to mind the old days of the Franklin Search Expeditions. These gentlemen are traveling more for pleasure than as explorers, but they have already (winter of 1908-9) penetrated into previously unvisited country northeast of Great Bear Lake and across the Coppermine to 67°45' N. This winter they will probably make one or more trips, into unknown country either to the north or east of Great Bear Lake. They have always wintered on the lake since coming north in 1908, at which time we were fellow-travelers down the Mackenzie. In the winter of 1908-9 they had headquarters on the east end of the lake just on the Arctic circle; in 1909-10 they were at the head of Bear River, and this winter just west of the mouth of Dease River. They have already supplied us with ammunition and with things we need and have offered to transport in their large boat across Great Bear Lake next summer any scientific collections we may secure this winter. It was a welcome surprise to discover their hunting camp east of the Dease in September, for they had planned to spend only two winters on Great Bear Lake and I supposed them to be already in England.

"Another unexpected neighbor is Mr. Joseph Hodgson, a retired officer of the Hudson Bay Company, who had been 'dreaming for years' of a chance to spend a winter at the mouth of the Dease and who has used his freedom from Company duties to carry out this dream. He has his whole family here and has built a comfortable house in the thick woods of the lower river valley. He has been no less kind than Messrs. Melville and Hornby in offering assistance to us. But everyone in this country lives from hand to mouth on game and fish,

so this does not mean that we have the opportunity of spending the winter in idle luxury.

"All those who live on the lake depend largely on fish, but as we have no nets we have established ourselves in a ten-acre patch of small spruce on the 'barren ground' on an easterly branch of Dease River, about thirty miles N. E. of the mouth of the main river. We would have preferred to be on the coast with the Eskimos, but unfortunately it is only too clear from the stories we have heard and the graves we have seen that famines are of frequent occurrence there in winter, and we should be more or less a burden, for I and my men are poor sealers compared with them. Besides, my people had their tussle with hunger last winter and are unwilling to take some risks which I don't much mind—they haven't the reasons that Dr. Anderson or myself have for submitting willingly to small privations.

"On parting from Dr. Anderson in March my last word was for him not to worry till Christmas (1910), but if we failed to be back by then he might undertake a 'rescue' expedition which would spoil his own plans and perhaps endanger collections he has made. For that reason I must try to reach him this fall, and I expect to start next week with one of my Eskimos (having two here) and a Bear Lake native to hunt for Anderson. I suppose him to be on Horton River about in Lat. $69^{\circ}15'$ N., Long. $123^{\circ}30'$ W., where we had our camp last winter. Going from our camp on the Dease to this point we shall be crossing one of the largest unknown areas in Canada, which is graced on the map with the mythical *Rivière la Roncière* and the doubtful *Macfarlane*, but the region is truly unknown because no explorer has been through this district. We already know that Horton River crosses and recrosses the supposed location of both these rivers between its mouth (see Franklin's map) and the charted location of Lake Granet. If we have luck we should on this trip be able to trace the main part of the course of Horton River—which is (so it seems to myself and all my Eskimos) a stream of about the size of the Coppermine and probably rises near Bear Lake.

"We are finding our lack of provisions more of a handicap than I had expected. We have used the larger part of our time these three years in making a living and have been compelled to abandon plans and forego opportunities because game was scarce, or was supposed so, in localities where useful work could have been done. A base from which one could start with loaded sleds into unknown areas would have doubled our results. Our custom of depending on the resources of the country makes gathering heavy or bulky collections practically impossible. We had to eat our entire zoological collection (caribou, wolf, fox, wolverine) in January, 1910, and that is but one of our many reverses.

"I am a little surprised that our achievements do not fall far short of predictions, for the difficulties have been greater than we thought. The rapid dwindling of the barren ground caribou has caused the largest discrepancy between our expectations and the facts—where other travelers have found their thousands we have had to make shift with dozens; the Eskimos that dressed in fawnskins a few years ago now dress in bull caribou, seal, fox and even fish skins. The only encouraging element in the situation is the gradual coming of the moose to the very outskirts of the forest area; there were none even along the west shore of Bear Lake in Richardson's time. Now they come well up Dease River and occupy the whole lake shore."

"Langton Bay, Dec. 6, 1910. [This date line shows that the explorer, after writing the letter of Nov. 3, had traveled to the northwest from Great Bear Lake at the mouth of the Dease River to the Arctic Ocean, about 250 miles.] We found last year that no 'Rivière la Roncière' reaches the ocean, nor any river corresponding to it, but that Horton River, whose mouth was first seen by Franklin's expedition, was a large river, apparently coming from a considerable distance. Last winter we followed it up from its mouth for perhaps 200 miles, measured along the bends of the river. We hoped therefore to strike it soon after leaving Great Bear Lake.

"We left the mouth of the Dease, Nov. 8, and followed the lake shore to a point ten miles east of the mouth of Fighting River. What the maps set down as a long point in Lat. $66^{\circ}55'$ N., Long. $119^{\circ}20'$ W. we found to be really a high, somewhat wooded but generally rocky island separated from the shore by a crooked channel in places not over 500 yards wide. From the point at which we left the lake our course was about west magnetic for five days, when we struck the Horton River. We followed the river through a winding course for twenty-one days and reached Langton Bay, Dec. 3. Game was scarce and we were on short allowance.

"Horton River has an average width of over fifty yards where we began to follow it, and for something like 400 miles it has an average width of over 100 yards always and generally over 200. It is swift but without bad rapids and is a stream that impresses one as larger than the Coppermine. Through the entire distance known to us till within fifty miles of the mouth there is plenty of spruce in the valley proper but hardly any on top of the banks in most places. There is but one large affluent, a stream at the juncture a little less than half the width of the main river or about 75 yards. The confluence is approximately in Lat. $69^{\circ}15'$ N., Long. $123^{\circ}15'$ West. From the confluence, Horton River flows about south true for 15 miles and thence N. W. and W. by an exceedingly crooked channel to the mouth west of the middle of the bottom of Franklin Bay (see Franklin's charts).

"I found Dr. Anderson and his four Eskimos awaiting me at Langton Bay. Last summer by a sled and boat journey of about 700 miles he reached Fort Macpherson and Herschel Island and was able to get possession of the supplies which should have reached us last year. These were carried for him by the steam whaler *Herman*, Capt. H. H. Bodfish, to Baillie Island and thence by the whaling schooner *Rosie H.*, Capt. Fritz Wolk, to Langton Bay, where they were landed the last week of August. Most fortunately for us, a whale killed by the *Rosie H.* drifted ashore near Langton Bay a few days later, so we have plenty of dog feed, and food for ourselves if necessary. Dr. Anderson and the natives had also killed about 30 caribou and six bears, and some supplies had been secured from the steamer *Herman* besides. We are therefore well off—free from anxiety about food and free to move about for the first time in years."

"Mouth of Dease River, Great Bear Lake, Jan. 21, 1911. Our return trip south across the Arctic divide proved slower and more difficult than we expected. It took thirty-three days against less than twenty as I had expected. The reason was that we attempted to haul too heavy loads—trade goods, mostly iron ware for the purchase of scientific specimens from the natives of Coronation Gulf. The snow was much deeper and softer than it had been on our northward journey in November, the weather so cold that iron sled runners grated on the snow as on sand and doubled the hauling weight of the sleds.

Securing caribou for food was difficult on account of the scarcity of the animals, and the shortness of the twilight period at noon. It was hard to find the animals, and hard to see the rifle sights for good shooting even if we did find a stray caribou. We were on short allowance, however, only for a few days. We got only three caribou but they were good sized ones. We had taken plenty of whale blubber along from Langton Bay and finally got to Great Bear Lake with ten or fifteen pounds of blubber left over—it stood both men and dogs in good stead.

“Our party was the same returning as it had been going north in November, except that Dr. Anderson accompanied us. We were finally forced to abandon 100 pounds of load, however—chiefly trade goods (about half of what we carried). Our dogs had become nothing but skin and bone and were not pulling much, so we could not have gotten the full loads across the divide about 100 miles of travel, with the barren ground of the Great Bear Lake Arctic divide about 60 miles wide. Going N. W. true from the mouth of Haldane River one reaches trees on the Horton about 55 miles from Great Bear Lake, and the barren ground on this route is about eighteen or twenty miles wide. The valley of the Horton shows outcrops of crystalline limestone practically everywhere, and in several places there are cañons of this rock up to 200 feet high.

“We start to-morrow for Coronation Gulf [over 120 miles to the N. E.] to visit the Eskimos there and to buy articles from them for an ethnological collection.”

A letter from Dr. Anderson, the zoologist of the party, to the American Museum of Natural History reports that he secured a large quantity of specimens between Cape Parry and Langton Bay during the collection season of 1910.

GEOGRAPHICAL RECORD

THE AMERICAN GEOGRAPHICAL SOCIETY

TRANSCONTINENTAL EXCURSION OF 1912. The American Geographical Society of New York proposes to celebrate the sixtieth anniversary of its foundation and the completion and occupancy of its new building by an international excursion of about six weeks' duration across the United States, followed by a meeting in New York City, in the autumn of 1912. The excursion will be directed by Professor W. M. Davis of Harvard University, who hopes to have the co-operation of a number of American geographers. It will be made in a special train, including sleeping cars, a dining car and an observation car. The date of beginning will be placed as late in August as possible, in order to avoid the heat of the American summer; the date of the end must be little later than the middle of October, in order to enable European members to return home in time for university duties before the end of that month. The precise dates of beginning and ending will be determined by later correspondence and by conference with intending participants who may be present at the International Geographical Congress at Rome in October, 1911.

The number of members will necessarily be limited to fifty or sixty persons (men only), of whom it is expected that thirty or more may be European geo-

graphers. Invitations to appoint delegates whom the Society may receive as members of the excursion have lately been sent to fifteen geographical societies of Europe, in Amsterdam, Berlin, Bern, Brussels, Budapest, Christiania, Copenhagen, Lisbon, London, Madrid, Paris, Rome, St. Petersburg, Stockholm, and Vienna. After information is received as to the European membership, it is intended that invitations to take part in the excursion shall be sent to a number of American geographers.

The route of the excursion as now planned includes the following points: New York, Chicago, St. Paul-Minneapolis, Butte, Seattle (possibly San Francisco), Salt Lake City, Denver, Grand Canyon of the Colorado in northern Arizona, St. Louis, Memphis, Chattanooga, Washington, New York. The features of the landscape will necessarily be the first objects of observation in an excursion across a continent, but attention will be given to various other matters as well, such as the relation of transportation lines to topographical features, problems of water supply and water power, corn and wheat on the prairies, cotton in the lower Mississippi valley, cattle ranching on the plains, various mining industries, Indian reservations in the western states, reclamation, irrigation, dry farming, forestry, etc., etc. This route will be changed should circumstances make it necessary or expedient. The monotony of overland travel by rail for forty or fifty days will be reduced by providing all possible comforts of train equipment, by frequent stops for short excursions on foot or otherwise, by occasional nights in hotels, and by abundant discussions of geographical problems.

The meeting in New York at the close of the Excursion will probably occupy two days. Foreign members of the party will be invited to make brief and informal communications on subjects that have excited their interest during the excursion, and to describe European parallels to American examples. Provision will probably be made for the subsequent publication of the papers thus submitted.

All correspondence regarding the Excursion should be addressed to Prof. W. M. Davis, director, c/o American Geographical Society, Broadway at 156th Street, New York.

NORTH AMERICA

MINERAL RESOURCES OF THE UNITED STATES. The annual report on the Mineral Resources of the United States for 1909 has only recently been published by the U. S. Geological Survey. The delay is due to the fact that, in order to ensure greater thoroughness, the statistics of mineral production in 1909 were collected under a co-operative agreement with the Bureau of the Census by means of a detailed canvass instead of by correspondence as heretofore. The report is published in two volumes, the first containing the statistics of the metals and the second the statistics of the non-metallic products of the country. A discussion of the production of metals in the United States from domestic and foreign ores, by Waldemar Lindgren, appears for the first time in these reports. A chapter on the Movement of Lake Superior Iron Ore in 1909, by John Birkinbine, accompanied by a map, is also an innovation. In the chapter on coal it is stated that revised estimates place the total original coal supply of the United States at about 3,076,000,000,000 short tons, of which only four-tenths of one per cent. had been exhausted at the close of 1909, leaving 99.6 per cent. as the apparent supply still available. Of the original supply of

anthracite, however, estimated at about 21,000,000,000 short tons, only 80 per cent. are still available. The several chapters composing the report have already been issued separately in pamphlet form and have been listed in the *Bulletin* under "Current Geographical Papers."

MR. RADFORD'S PROGRESS IN NORTHERN CANADA. Mr. Harry V. Radford, whose earlier work on his present expedition for collecting natural history specimens and geographical exploration in northern Canada has been briefly referred to in the *Bulletin* (Vol. 43, p. 134, Feb. 1911), writes to the Society from Fort Resolution, Great Slave Lake, Canada, July 9, 1911, that he and his assistant, T. George Street of Ottawa, left Fort Smith on June 27, and reached Fort Resolution by canoe on June 30. The two men intended to leave in their canoe on July 1 for Chesterfield Inlet, which they hoped to reach toward the end of September on their way to the North Coast through the Barren Grounds. A white man who had agreed to accompany them to the Arctic, deserted at Fort Resolution. He was the fourth white man to desert, and Radford and Street expected to make the trip alone. Mr. Radford adds: "It is rather a small crew for such a voyage, with many portages, rapids, etc., on the way, but I believe we can get through safely. There are no natives between Artillery Lake (Yellow Knife Indians) and Baker Lake (Eskimos), and most of the way is through the treeless Barren Grounds."

Two Indians were to accompany them in another canoe, as far as Artillery Lake, to lighten the load to that point, and help over the six or eight portages.

"We can manage to stow into our canoe only 437 pounds of food supplies, in addition to the bedding, arms, ammunition, scientific equipment, etc., that must be carried. This is hardly adequate for the two and a half months' journey to Chesterfield Inlet. I am supplying the Indians with 225 pounds additional food supplies, which are to see them to Artillery Lake and return. Street and I are depending upon securing game and fish along the way—as we carry nets and a plentiful supply of ammunition. Probably we shall have no food supplies remaining when we reach Chesterfield Inlet; but if the relief supplies requested are sent there this summer, by vessel [they were forwarded by Mr. Anthony Fiala, of the Arctic Club, through the co-operation of the Arctic Club and the Hudson Bay Company], Street and I propose to winter with the Eskimos at Baker Lake in snow houses, proceeding to the Arctic coast in the early spring. Should the supplies not arrive, it will probably be necessary for us to retreat this fall to Fort Churchill (350 miles south of Chesterfield Inlet) before the freeze-up.

"The zoological and botanical collections have been continued. All of these specimens have been forwarded to the United States Biological Survey, Washington, for determination. To date the specimens number: Mammals 67, birds 22, insects 47, plants 150, geological 10, and ethnological 40. About 400 stereoscopic photographs have been taken.

"The maps, showing results of my explorations east and west of the Slave River during the past two years, were completed during the last weeks of my residence at Fort Smith, and sent to the Interior Department of Canada. The discoveries include a large river—the Thalsen, 600 miles in length; many lakes, including Lady Grey Lake, nearly 100 miles in length; and other natural features."

SEARCHING FOR MINERAL FERTILIZERS. The *Press Bulletin* of the U. S. Geological Survey (Aug. 31, 1911) says that the field force of the Survey is carry-

ing on searches for deposits of minerals which shall furnish the three necessary elements of plant food, phosphate, nitrate and potash. The Survey has already discovered and surveyed enormous deposits of phosphate rock, and 2,398,590 acres of public land containing phosphate, withdrawn at the recommendation of the Geological Survey, are now awaiting legislation by Congress to enable their development. In order, however, to insure an "all-American" fertilizer, regardless of importations from other countries, it remains to discover deposits of nitrate of soda and potash salts. As both of these minerals are readily soluble and are not to be found as "outcrops" like ordinary rocks, the mission of the Survey is not an easy one. Nevertheless, it is believed that the geologic conditions prevailing throughout a large portion of the arid West favored the accumulation, during earlier periods of the earth's history, of both of these salts and that if these still exist in concentrated deposits it is only a question of search to discover them.

HALF A BILLION TONS OF COAL. For the first time in the history of the United States, the coal mines of the country in 1910 were credited with an output exceeding half a billion short tons, the combined production of anthracite, bituminous coal, and lignite having amounted to 501,576,895 short tons, with a spot value of \$629,529,745. This great output according to Edward W. Parker, Coal Statistician of the United States Geological Survey, was attained in spite of the fact that most of the mines in Illinois, Missouri, Kansas, Arkansas, and Oklahoma were closed for nearly six months by one of the most bitterly contested strikes in the history of the industry. The heaviest tonnage mined in any year previous to 1910 was in 1907, when a total of 480,363,424 short tons was produced.

THE ATLANTIC AND PACIFIC TRANSPORT CO. Press despatches report the organization of a steamship company which will operate lines to connect the Atlantic with the Pacific, seaboard after the opening of the Panama Canal. The company was incorporated under the name of the Atlantic and Pacific Transport Co. It will bid on contracts now being advertised by the Postmaster General, which call for weekly ocean mail service between New York and Colon in six days, with stops at Charleston and Savannah; between New Orleans and Colon in four days and between San Francisco and Panama in ten days, with alternate stops at San Diego and San Pedro; and for a fortnightly service between Seattle and Panama in sixteen days, with a stop at Astoria. Although connection between the above ports is alone required the new company intends to make use of the Panama Canal and will inaugurate a continuous service between Atlantic and Pacific ports. In addition to the above lines it expects to extend its operations and have steamers sailing from Portland, Me., Boston, Philadelphia, Baltimore, Norfolk, Jacksonville, Key West, Mobile and Galveston through the canal to the Pacific Coast ports and *vice versa*. The company also expects to handle a great traffic at the Panama and Colon terminals of the canal, this trade to consist of trans-shipments to and from Central American markets and to and from the canal in connection with foreign ships from all parts of the world.

The charter of the company has been drawn up so as to conform with the requirement of the Post Office Department that the company receiving the mail contract must in no way be connected with any organization "engaged in any competitive transportation business by rail."

W. L. G. J.

CARTOGRAPHICAL

COLORING OF RELIEF MAPS. The *Geographical Journal* (Vol. 38, p. 79, 1911) says that among the Austrian workers in the direction of an improved scheme for the coloring of relief-maps, based on the optic properties of colors, Herr G. Freytag, of the Cartographical Institute of Freytag and Berndt, at Vienna, deserves credit for the results attained. Like Dr. Peucker he has been working at the question for some years, and has arrived independently at a solution, which is briefly described in a pamphlet issued by his firm this year. It is accompanied by a specimen relief-map colored according to the scheme adopted, the effect of which is perhaps as satisfactory as any of the attempts hitherto made in the same direction. The stereoscopic effect of the colors selected is well brought out by a pair of diagrams, in the first of which a square is colored with the reds in the center, these passing outwards through yellow to green and blue; in the other the order is reversed. The former gives the appearance of being raised, the latter of being depressed, in the center. The gradations are brought about by the differences in the tints, the strength remaining the same, so that violent contrasts are avoided.

AVIATION CARTOGRAPHY. The Geographical Service of the Army of France has caused a map to be made of a region, 50 miles by 80, about Chalons, "the center of aviation," which is published in the *Annales de Géographie* for August. It is on the scale of 1:200,000, about 17 by 26 inches in size, and in six colors. Every kind of road, railway, tramway, and electric wires is indicated, as well as the contours of the land, with heights given, the forests, streams, marshes, ponds, cultivated tracts, inhabited places, stations, garages, churches, graveyards, towers, windmills, forts, and even isolated trees and places dangerous for alighting. The map is beautifully executed. It is regarded as so successful that the minister of war has ordered the preparation of similar charts of the regions about Paris, Amiens, and Mézières, for use in the army manœuvres.

GEOGRAPHICAL SOCIETIES

MAJOR LEONARD DARWIN'S SUGGESTIONS FOR THE FUTURE WORK OF THE ROYAL GEOGRAPHICAL SOCIETY. In his address to the Society on May 22 (*Geogr. Journ.*, July, 1911), the retiring President made suggestions that are worthy of more than local consideration. A few extracts from the address are given here. After alluding at some length to the fact that the great era of pioneer exploration is practically a finished chapter, Major Darwin said, among other things:

"We ought no doubt, in view of the changing conditions, to direct our efforts with more persistence than heretofore in the direction of encouraging travelers to make systematic and detailed examinations of comparatively small areas, and not merely to cover long distances with the result of doing little more than confirm the impressions of previous explorers. Their surveys should be as good as is possible in the circumstances, and the information they collect should be extensive, varied, systematic and recorded with reference to the needs of the students of science and history, as well as of the man of commerce. In short, the traveler of the future ought to be a trained topographer, or to have thoroughly prepared himself in advance for some definite class of investigation, if he wishes to win our praises. . . .

"In many directions what is now most needed is not the gathering of more

crops, but rather the tedious task of systematizing, collating and indexing what is already in hand. . . . In short our aim should be, it is suggested, with the aid of maps, to correlate and popularize all knowledge which can thus conveniently be harmonized, laying especial stress on all matters of direct importance to the human race. There are obviously certain branches of learning which are clearly within our dominion, such as geodesy, surveying, topography and cartography, and to these especial attention should be paid. But as to the territories belonging to the other sciences, it would be well if we make it clear that we have no wish to annex them, our only object being as it were to trade with them in order to utilize the goods they produce and to make them more widely known and appreciated. . . .

"As regards internal administration, the aim must be to make the Society's house a place where accurate information can readily be obtained concerning all countries, including our own, the information thus supplied being all that could be described as geographical within the most elastic meaning of the word. The acquisition of suitable maps and books should, indeed, in future only be limited by financial necessity, whilst the collection of geographical photographs should be well maintained. No pains should be spared to make our systems of indexes as perfect as possible, a subject to which, as a fact, considerable attention has recently been paid; and with such aids the staff should be in a position to give every assistance to all students wishing to utilize the vast stores of information which the premises should contain. In short, we shall want more maps, more books, more photographs, and a more convenient house to hold both them and the steadily accumulating objects of interest which we own; and if the Society continues to grow in usefulness on the lines suggested, we must look forward to the possibility of a material increase being needed in the number of the staff. Moreover, our means of keeping in touch with foreign countries should be considered from time to time, to see if they are not capable of improvement. For example, as a single possible suggestion, might it not be worth considering whether British consuls, whilst actually serving abroad, should not be allowed to join our ranks with some special advantages as regards fees?

"As to the work of exploration and investigation for which we are not directly responsible, this should, as heretofore, continue to receive our warmest encouragement and our help when possible. And as to the award of medals, which has undoubtedly had such a stimulating effect in the past, it is perhaps worth noting that the task of selecting the recipients is likely to increase in difficulty as the opportunities for startling achievements become less frequent. The geographical work of our descendants is likely, as far as we can now see, to be more often noteworthy for thoroughness than for brilliancy; and thoroughness, it may be hoped, will never be a rare quality, amongst our fellow-countrymen at all events. No alarm, therefore, should be felt if some considerable changes in the method of making our awards should be made in the course of the next few years. It will only be one of the many symptoms of the wide changes taking place in the whole field of science; changes which necessitate our efforts being constantly directed towards ensuring that the work done in the geographical world be increasingly systematic, scientific and thorough, as well as more and more calculated to be advantageous to mankind."

GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY)

BOOK REVIEWS AND NOTICES

(The size of books is given in inches to the nearest half inch.)

AMERICA

A Bibliography of the White Mountains. By Allen H. Bent. vii and 114 pp., illustrations and index. Published for the Appalachian Mountain Club by the Houghton Mifflin Company, Boston, 1911. 8½ x 6.

All lovers of the White Mountains will welcome this book. Its pages show that at least 285 books and pamphlets have had something to say about the White Mountains. It also records nearly 300 magazine articles, a third of which have appeared in *Appalachia*; and there are also recorded about 150 poems, fifty newspapers that had been printed in White Mountain towns, thirty-six maps, and a list of early engravings. Among the producers of literature relating to the White Mountains were Longfellow, Whittier, Hawthorne, Parkman, Thoreau and Thomas Starr King. The Appalachian Mountain Club is to be congratulated on this suggestive and helpful work. It gives the guidance to the literature of the White Mountains that has long been needed.

AFRICA

A Bibliography of Sierra Leone. With an Introductory Essay on the Origin, Character and Peoples of the Colony. By Harry Charles Lukach, M.A. 144 pp., map, appendix and index. Clarendon Press, Oxford, 1910. \$2.90. 9½ x 6.

This list of books solely devoted to Sierra Leone is practically exhaustive though doubtless many articles in the journals of learned societies and magazines are not here recorded. The "Observations of William Finch, Merchant, taken out of his large Journal" being Finch's remembrances of his visit to that country in 1607 is printed in full because it is the most complete of the early accounts of Sierra Leone. In his introductory essay the author says: "The prosperity of Sierra Leone depends and always will depend on agriculture, and the best system of training for the people is therefore one which will teach them to extract the full value from the soil."

L'Angleterre en Afrique. Capitaine E. de Renty. 266 pp. and 9 maps. Henri Charles-Lavauzelle, Paris, 1911. 4 Fr. 9 x 5½.

The author's three volumes on "Les Chemins de Fer Coloniaux" made him well known as a careful writer. In this small book he gives the essential features of the history and development of each of the British African colonies, but the treatment is too concise to admit of a thorough exposition of the subject. The material development of each of the colonies receives most attention, but some of the most important phases of development which have occurred within the past two or three years are not indicated in the book.

ASIA

The Provinces of China. Together with a History of the First Year of H. I. M. Hsuan Tung, and An Account of the Government of China. Reprinted from "The National Review" (China) as "The National Review Annual," 1910. With a Preface by Colonel C. D. Bruce. 179 pp., illustrations and indices. The National Review Office, Shanghai, 1910. 9 x 7½.

This is really a primer of Chinese national life, far in value above the unpretentious gazetteer which at first inspection it seems to be. It is very hard to say in a general definition what China really is, and without that definite knowledge of the present it is still more difficult to forecast what China is to become. But if a comprehension of the Middle Kingdom as a whole evades inquiry the detailed study of its component provinces must bring us closer to such knowledge. On that principle this work has been compiled. It does not profess to be original. Its authors have taken the best from the standard authors, they have drawn upon all records of information with due assignment of credit. Province by province they have sketched the natural and economic geography of the empire in a way which will serve to present valuable information at the point where it is directly valuable and at the same time to guide the inquirer to sources of further information. It pretends to be no more than a handbook, but the student of Chinese affairs will find it a valuable book to have at hand.

WILLIAM CHURCHILL.

Islam in China. A Neglected Problem. By Marshall Broomhall, B.A. xx and 332 pp., maps and illustrations, appendices and index. China Inland Mission, London, 1910. 7s. 6d. 10 x 6.

China's people are so numerous small wonder we had not noticed those five or ten millions of Mohammedans among them. Yet there is a mosque in every sizable city, thirty perhaps in Peking, schools for the teaching of Arabic, mulahs who speak Arabic, Chinamen who have pilgrimaged to Mecca, and Chinamen who pray toward Mecca with sacred, if uncomprehended, Arabic words. No province is without its Moslem contingent, though in Fukien, opposite Formosa, they number but a thousand. Fairly half the total of the Empire live in the western provinces, Kansu, which marches with Mongolia and Tibet and Yunnan on the Burman border.

The western Moslem is superior physically to the other Chinamen, straighter of eye, of strong nose and beard and better color. He is a cattle man where the Chinese are agricultural. He is skilful and courageous. Doubtless from these western borders the Mohammedans first entered the country. Two immigrations are probable: in the eighth century when Persia first succumbed to Arabian expansion and again by refugees from the devastations of Jenghis Khan. But Islam in China has lost memory of both occasions and sought to ally itself with the Prophet himself by a legend widely current that sends Mohammed's maternal uncle on a mission to Canton in 581 to 601 A. D. and has him build there the Mosque of the Holy Remembrance and the Smooth Pagoda. As Mohammed was born in 570 A. D. so early a Mohammedan mission starts investigation. Astronomical considerations fairly assure us of the invention of the legend in the fourteenth century, and even of the falsifying of the date of a monument at Sianfu, supposed to be of 742.

A hundred and fifty years ago the Moslems were equal before the law to other religionists in China, treated indeed with admirable liberality, but a series

of persecutions, massacres and uprisings in the west have changed that. For the twenty years preceding 1873 Yunnan and still more Yakoob Khan's country adjoining Kansu were fairly independent Mohammedan kingdoms, recognized indeed by European powers as independent. But the risings were put down, with enormous treachery and bloodshed—it is said 10,000,000 were slaughtered—and to-day the Mohammedan is hedged about with restrictions much like those the Jew suffers in Russia. His mood, the author feels, gives unequalled opportunity for Christian propaganda. His Mohammedanism is not bigoted.

The above has been fairly dug out of the author's pages, which read heavily. The pictures of mosques and race types are very fine. MARK JEFFERSON.

Lord Curzon's Administration of India. What he promised; What he Performed. By Syed Sirdar Ali Khan. 119 pp. Times Press, Bombay, 1905. 9½ x 6½.

In the six years which have elapsed since the publication of this laudation of a recalled Viceroy of the Indian Empire there has been unrest in India amounting at times to sedition and murder. Viewed against this background of events it would verge upon the polemical if the reviewer were to seek to estimate the value of this estimate of a ruler by one of the ruled. The plan which the author has set before him is to deal topically with the twelve subjects which Lord Curzon announced in his budget speech as about to claim his attention. Their scope may be estimated from the fact that the first is the greater strategy of the northern frontier against Russia, and the last is the reform of the village schoolmaster and the village policeman. Speaking for his own opinion, but probably representative of much of the sentiment of Mohammedan India, the author finds that each of the twelve topics has been carried forward to a most successful end. Time alone can determine these things; in the meanwhile geographers will be pleased to see that some measure of appreciation has come to an administrator who at one time gave promise of adding new chapters to our knowledge of the wild parts of inner Asia. WILLIAM CHURCHILL.

The Racial Anatomy of the Philippine Islanders. Introducing New Methods of Anthropology. By Robert Bennett Bean, B.S., M.D. 236 pp., illustrations and appendix. J. B. Lippincott Company, Philadelphia, 1910. 8 x 5½.

The data from the Philippines here assembled, and particularly the method of treatment to which they have been subjected, will prove of extreme interest to anthropologists. There is rich promise that the method which Dr. Bean has worked out as lucidly as laboriously may prove to be, as with the pride natural to the discoverer he describes it, a new departure in that important science. Hitherto the results of anthropometry in establishing race type have been based upon the skull and the skeleton, the anatomy of the hard and inner parts. When dealing with the living specimen it is impracticable to take accurate measurements of his inner anatomy, it is equally inconvenient to postpone the determination until the skeleton becomes available. Dr. Bean has invented in this work a racial anatomy of the living and has founded it upon the measurement of the soft and exterior parts. The special student of such themes will find pleasure in following out the author's careful establishment of comparative values of his classification by the morphology of the ear helix and the omphalic index with the older types established upon the cephalic index and skeletal structure in

general. If his conclusions work out according to his expectation he will have performed the very great service of moving anthropometry from the museum to the field. Geographers whose highest interest is in the movements of population will observe with peculiar satisfaction that Dr. Bean's method of study has availed to discover in the Philippines, both free and in easily dissociable relations with superior race types, man of a primitive type. It is not wholly surprising. No matter what the avenue along which research has been conducted in the region of which the Philippines forms the northeastern sea wall, we find ourselves brought to the necessity of regarding this area as containing somewhere a focus at which a human species arose. Students of culture have for some time had to face this problem, and it is within the last few months that a Negrito people (the Kubu) has been found by Volz in south Sumatra on that bottom plane, once considered inconceivable, where spiritual ideas and some rude conception of divinity have not yet dawned. The most recent philological examination directed upon this region is utterly meaningless if it does not point out a clear evolution of man-speech from animal-cry. The question of *Pithecanthropus*, not as yet definitely settled, arose in the same terrain. It is full of grave significance that Dr. Bean enjoyed for a day the opportunity to measure and to photograph a living man of the almost chinless Cro-Magnon type, palæolithic man persisting far beyond his epoch. WILLIAM CHURCHILL.

The Glory of the Shia World. The Tale of a Pilgrimage. Translated and Edited from a Persian Manuscript by Major P. M. Sykes, C.M.G., assisted by Khan Bahadur Ahmad din Khan. xiv and 279 pp. Macmillan & Co., Ltd., London, 1910. \$3.50. 9 x 6.

The geographical interest of this narrative is in some regards slight. The author has crowned his life by an act of piety in making the pilgrimage to Khorasan, to the tomb of the great Imam of the Shiite sect of Mohammedans. That is not a long journey from his home in Kerman, the desert land traversed is not by any means unknown. The sum of his contribution to such knowledge is the plan of the mosque and precincts of Meshed, pleasantly illuminated by his comments wherein piety and humor are mixed. Nurullah Khan, the author of the manuscript, although space was grudged his name on the title-page, is a man of the transition. His grandfather was the famous Haji Baba, who was the first of Persians to carry the fame of the Shah to England, and Nurullah naïvely expresses his conviction that his grandfather must have declined the Garter at the English court, since he did not bring it home with him. Nurullah's youth was spent in Mahmun, where his father was provincial Governor until he came to his death in a salt-bog while pursuing Baluchi marauders. Thereafter he lived with his uncle, the revenue officer of Kerman, at first as an assistant in that profitable employment and eventually as successor to the appointment upon the death of his uncle. Persian to the core, he is yet acquainted with the existence of Europe and the New World, he knows that "Atlantic is not a city," he is at pains to explain many things for the benefit of Europeans who might read his book. It is that which makes the narrative of such value, a picture of Persian life by a man who goes out of his way to make things comprehensible to such as are unfamiliar with the ways of Iran. The mere journey to Meshed occupies but a third of the volume, the value of the work will be found to lie in its intimate revelation of Persian custom. Nurullah is something more than an official, although he is proud to have so profitable an

employment. He is a poet, he concedes willingly that he stands second to Firdausi in his art. He concedes that Persia is the best of all possible lands, that Persian courtesy is the pink of all politeness, that Persian achievement is superior to all deeds elsewhere in the world. In Persia the best is represented by Kerman. This is not the sublimity of impudence, it is the sublimity of belief based upon conviction. Nurullah does not prove any of his contentions, he states his belief in happy assurance that these are self-evident facts. It results that we have a quaint medley of braggadocio and simplicity, but throughout runs a most interesting account of Persian life as seen by a Persian willing to point out its beauties to the alien. The work is veritably a storehouse of information as to Persian customs, folk-lore and opinions. Unfortunately, the storehouse is locked, the absence of an index is now inexcusable. Happily for the reader, Nurullah lives far from the capital, Kerman is for him the heart of the world, it is only through the presence of an English physician that he has been led to set forth for the foreign reader his knowledge of a Persian life still uncorrupted by external ideas.

WILLIAM CHURCHILL.

EUROPE

Kulturgeographische Wanderungen im Koblenzer Verkehrsgebiet. Von Dr. R. Martiny. pp. 189-349, map and illustrations. Forschungen zur deutschen Landes- und Volkskunde herausgegeben von Dr. Fr. G. Hahn, Neunzehnter Band, Heft 3. Verlag von J. Engelhorn's Nachf., Stuttgart, 1911. Mk. 9.50. 9 x 6½.

Dr. Martiny, following the general scheme of these books, interprets the Coblenz trade district in its cultural development, showing the natural reasons which have partly influenced the location of its towns, its industrial establishments, its railroads and other highways, vineyards, fields, forests, etc., describing also the various directions in which the cultural life of the people has developed. The book contains an excellent folded map and is a careful and minute study in anthropogeography.

Guide to Italy and Sicily. Sixth Edition. cxxviii and 394 pp., 19 maps, 36 plans and indices. Macmillan & Co., Ltd., London, 1911. \$3.25. 6½ x 4½.

The sixth edition of this useful guide book will be welcome. It is a concise and handy volume which omits no really important sights of Italy, though careful not to confuse the tourist by diverting his attention to the insignificant. The needs of all kinds of tourists are kept in view and even cyclists will find considerable matter intended especially for them. The maps and plans, of course, add much to the helpfulness of the work.

POLAR

Polar Exploration. By William S. Bruce, LL.D., F.R.S.E. 254 pp., maps and index. Henry Holt and Co., New York, 1911. \$.75. 7 x 5.

This is not a history of Polar exploration but rather a book written for a wide public outlining the essential facts and problems of exploration in high latitudes. Dr. Bruce has had personal experience in nine Polar voyages and leadership in several of them. In this little volume he gives in a most readable manner the quintessence of his experience and observations. His topics as given in the ten chapter headings are:

Astronomical Features of the Polar Regions; The Polar Regions; Land Ice;

Sea Ice and Coloration of Ice and Snow; Plant Life; Animal Life; Physics of the Polar Seas; Meteorology; Magnetism; Aurora, and Tides; Aims and Objects of Modern Exploration.

A short quotation is given here as illustrative of the style of the book and of the interesting and edifying nature of its contents. After writing (pp. 190-1) of the Antarctic deep-sea deposits of globigerina ooze, red clay, and diatom ooze, Dr. Bruce continues:

"To the south of this belt or band of diatom ooze we have a continuous ring south of 60° S., which is a deep-sea deposit of blue mud. In the Weddell and Biscoe Seas we have a small patch in the blue mud region which seems to be a sort of mixture of blue mud and red clay, and which is associated with the area of deep water mapped out by the *Valdivia* and the *Scotia*. A special point of interest in this blue deposit is found on examining maps of deposits in different parts of the world, when it is seen that this deposit is always associated with continental lands. It occurs round the whole of the coasts of South and North America; round the coasts of Europe, Asia, and Africa. There is, in fact, no continental coast which is not bounded by blue mud. The natural inference, therefore, is that when we find blue mud surrounding an area of land about the South Pole that it is there in association with a great mass of continental land . . . The important feature to remember is the diatom ooze at the bottom of the Antarctic and subantarctic seas and the blue muds in the vicinity of all known Antarctic lands, indicating a greater extension of those lands and the existence of a great Antarctic Continent, further proof of which has already been given."

A charming and thoughtful work that will help many readers to a more intelligent appreciation of Polar exploration.

The Toll of the Arctic Seas. By Deltus M. Edwards. x and 449 pp., map and illustrations, appendix and index. Henry Holt & Company, New York, 1910. \$2.50. 8½ x 6.

Mr. Edwards has collated here a large number of thrilling or tragical incidents connected with Arctic exploration, some of which have not been hitherto published. Many of his stories were gleaned from old accounts of the explorers themselves, from obsolete reports of Army and Navy inquiries and from private journals and manuscripts. The book is interesting as a chronicle of accidents and great catastrophes, part of the price the world has paid for its present wealth of knowledge of the Arctic. The incidents are not given in chronological order and the first great Arctic tragedy involving the death of Sir Hugh Willoughby and his comrades is referred to near the end of the book.

GENERAL

Geologen-Kalender. Begründet von Geh. Rat Prof. Dr. K. Keilhack. Herausgegeben unter Mitwirkung der Deutschen Geologischen Gesellschaft. Neunter Jahrgang für die Jahre 1911-1912. Bearbeitet von Dr. W. Quitzow. Leipzig: Max Weg, 1911. 516 and 52 pp. 4 marks. 6½ x 4½.

The Geologen-Kalender is a publication for geologists similar to the Geographen-Kalender for geographers. It is issued every two years. In the current edition it has been considerably expanded. It contains a directory of

geologists (pp. 1-193); a list of the geological surveys of the world, with notes on their organization, personnel and publications, and with index maps of the geological maps of the majority of European countries (pp. 194-299); a list of university instructors of geology, mineralogy and allied sciences (pp. 299-332); a list of the geological and allied societies of the world (pp. 233-356); a note on the International Seismological Association (pp. 356-361); a note, with index map, on the International Geological Map of Europe (pp. 362-364); a list of European geological collections (pp. 364-468); besides various tables and notices of interest to the geologist. The value of this manual is illustrated by the fact that until the recent publication of U. S. G. S. *Bull.* 465, the only systematized information available concerning the state surveys of the United States, was, so far as the reviewer is aware, that to be found in the *Geologen-Kalender*.

W. L. G. J.

Wind und Wetter. Fünf Vorträge über die Grundlage und wichtigeren Aufgaben der Meteorologie. Von Prof. Dr. Leonard Weber. iv and 116 pp., illustrations and index. Verlag von B. G. Teubner, Leipzig, 1910. Mk. 1.25. 7 x 5.

Judging by the number of text-books of meteorology which have appeared in Germany during the last few years, German publishers must be very hospitably inclined towards such books. Moreover, several of these volumes have gone into second, or even third, editions, which is good evidence of the wide popular interest in the science abroad. In our own country, the situation is in both respects, unfortunately, very much less encouraging.

Dr. Weber's "Wind und Wetter," now in its second edition (the first was dated 1903), is based upon five lectures, originally delivered in a popular high school course in Kiel (1902). The book gives a clear and concise view of the larger relations of meteorology, and while it obviously cannot, within the limits of its 113 pages, go into details, the author has succeeded well in presenting his subject in an interesting and popular manner. Twenty pages are devoted to balloon and kite meteorology, and this chapter contains a few pages on the mechanics of kite flights. One of the best chapters is that on weather forecasting, from which we quote the following: "There is no absolute mathematical certainty, even in 24-hour forecasts, because of the number and the complexity of the possible combinations. Even when we use the utmost care in taking account of all the laws which hold for isobars, storm tracks and weather types; even when we read our instruments with the greatest accuracy and consult the most skilled weather prophets among shepherds and sailors, there still remains a certain part of the problem in which the art of 'weather talent' and routine, rather than exact analysis, must come into play." This is a good statement, especially for the 'general public.'

R. DEC. WARD.

L'Epoca delle Grandi Scoperte Geografiche. Seconda edizione rinnovata ed accresciuta. By Carlo Errera. xxiv and 463 pp., maps and index. Ulrico Hoepli, Milano, 1910. L. 6.50. 7½ x 5.

The second edition of this important work has been revised and somewhat enlarged. It gives a connected account of the early voyages and discoveries and of the growth of geographical knowledge from the time of the Roman Empire through the medieval era and the great discoveries of the fifteenth and sixteenth centuries down to the day of Magellan. It shows how the extension

of geographical knowledge in the Middle Ages prepared the way for the great discoveries of the Columbian era. The author estimates that less than one-twenty-fifth of the surface of the globe is now unknown. A number of plates reproduce old maps by Beatus, Fra Mauro, Juan de la Cosa, Waldseemüller, Ribero and others.

A Treatise on Electrical Theory and the Problem of the Universe.

Considered from the Physical Point of View, with Mathematical Appendices. By G. W. de Tunzelmann, B.Sc. xxxi and 654 pp., illustrations and index. J. P. Lippincott Company, Philadelphia, Pa. \$4.50. $7\frac{1}{2} \times 5\frac{1}{2}$.

The fundamental aim of this extensive treatise is to show the existing state of electrical theory as far as may be without requiring of the reader further mathematical attainments than are regarded as the minimum equipment of the student of physics.

Check-List of North American Birds Prepared by a Committee of the American Ornithologists' Union. Third Edition (Revised).

430 pp., maps and index. American Ornithologists' Union, New York, 1910. $9\frac{1}{2} \times 6\frac{1}{2}$.

The first Congress of the American Ornithologists' Union in 1883 appointed a Committee, to which was referred the question of a revision of the classification and nomenclature of the birds of North America. This is the third edition of the Check-List, which comprised the results of the work of the Committee. The changes in nomenclature from the second edition are numerous, owing largely to the recent great activity in bibliographical research. The provisional bird zone map illustrating the work is the fourth that has been issued.

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GENERAL

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NEW MAPS

EDITED BY THE ASSISTANT EDITOR

System Followed in Listing Maps.

Title. As on original, if possible. If lacking or incomplete, necessary matter enclosed in brackets.

Scale. Natural (unless otherwise on original), followed by equivalent in miles to one inch. If no scale on original, approximate scale enclosed in brackets.

Coordinates. Approximate limiting coordinates of map given. Where map-net lacking, coordinates, if possible of determination, given in brackets. All meridians referred to Greenwich. If map not oriented N., orientation given.

Colors. Number of tints of separate symbols, not number of color printings given. Black or basal color not considered a color.

Source. If map separately published, name of institution issuing it, place and date given. If a supplement, title of paper or book, author, periodical, volume, pages and year given.

Comment. Descriptive and Critical. In brackets.

Regional Classification. Major political divisions the unit, as a rule, except for United States and Canada. Boundaries of continents according to Siever's *Länderkunde*, Kleine Ausgabe.

MAPS ISSUED BY UNITED STATES GOVERNMENT BUREAUS

U. S. GEOLOGICAL SURVEY

ALASKA. [Maps accompanying "The Mount McKinley Region, Alaska" by A. H. Brooks, U. S. Geol. Surv. *Prof. Paper* 70, 1911:] (1) Relief Map of Central Alaska. Compiled from maps by U. S. Geol. Surv. 1:2,500,000 (1 in.=39.46 miles). 67°-59' N.; 151°-141° E. 2 colors. Pl. II, facing

p. 42. [Relief in rather weak brown shading.] (2) Geologic Sketch Map of Central Alaska, with sections. 1909. 1:5,000,000 (1 in.=78.91 miles). 68° - 59° N.; 154° - 141° E. Pl. VIII, facing p. 50. (3) Geologic Map of Fairbanks District by L. M. Prindle and F. J. Katz. [1:2,300,000 approx. (1 in.=36.3 miles approx.)] Oriented N.35°E. 65° N. and 147°45' W. Pl. XVII, facing p. 180. (4) Sketch Map of Bonfield and Kantishna regions. [1:1,250,000 approx. (1 in.=19.7 miles approx.)]. 65° - 63° N.; 151½° - 147½° E. Fig. 28, p. 170. (5) Sketch Map showing distribution of timber in Mount McKinley region. [1:3,000,000 approx. (1 in.=47.3 miles approx.)]. 65½° - 61° N.; 154½° - 147½° W. Fig. 30, p. 207. [Distinguishes between timbered areas, sparsely timbered areas, areas above timber.] (6) Reconnaissance Map of Mt. McKinley region, Alaska. Surveyed 1902-06. Edition 1911. 1:625,000 (1 in.=9.88 miles). 65°50' - 60°53' N.; 154°40' - 147°15' W. 2 colors. Pl. III, in pocket. [Relief in brown contours, interval 200 ft.; drainage and glaciers in blue. Dotted lines represent probable topography, unsurveyed. The latest authoritative map of the region.] (7) Geologic Reconnaissance Map of Mount McKinley region, Alaska. By A. H. Brooks and L. M. Prindle. 1:625,000. Same coordinates as above. 21 colors. With "Key Map" showing by whom areas have been surveyed geologically, and three sections. [Geology superimposed on the preceding topographic map.] (8) Reconnaissance Map of the Yentna Mining District, Alaska. Triangulation and Topography by R. W. Porter. Surveyed in 1906. 1:250,000 (1 in.=3.95 miles). 62°0' - 61°56' N.; 152°50' - 150°10' W. 3 colors. Pl. XV, in pocket. [Relief in brown contours, interval 200 ft.]

GENERAL LAND OFFICE

ARIZONA. Territory of Arizona. Compiled from the official Records of the General Land Office and other sources under the direction of I. P. Berthrong, Chief of Drafting Division, G. L. O. 1909. 1 in.=12 miles (1:760,320). 6 colors.

[Relief in brown shading. Shows boundaries of counties, National Forests, Indian and Military Reserves, etc. Present edition of this standard map in the series of maps of public-land states issued by the Genl. Land Office.]

UTAH. State of Utah. Compiled from the official Records of the General Land Office and other sources under the direction of I. P. Berthrong, Chief of Drafting Division, G. L. O. 1908. 1 in.=12 miles (1:760,320). 6 colors.

[Same remarks apply as to the G. L. O. map of Arizona, above.]

WEATHER BUREAU

UNITED STATES. [Seven meteorologic maps of the United States, 1:20,000,000 approx. (1 in.=316 miles approx.), for April 1911, showing:] (1) Tracks of Centers of High Areas; (2) Tracks of Centers of Low Areas; (3) Departure of the Mean Temperature from the Normal; (4) Total Precipitation; (5) Percentage of Clear Sky between Sunrise and Sunset; (6) Isobars and Isotherms at Sea Level; Prevailing Winds; (7) Total Snowfall. 1 color. Map (6) 2 colors. Accompany, as charts II-VIII, *Monthly Weather Review*, Vol. 39, No. 4, April, 1911.

BIOLOGICAL SURVEY

COLORADO. (a) Life Zones of Colorado. 1 in.=22 miles (1:1,393,920). 4 colors. [Fundamental bio-geographic map of Colorado. Distinguishes, after Merriam, between Upper Sonoran, Transition, Canadian, Hudsonian, Arctic-Alpine Zones.] (b) [25 maps of distribution of certain animals, mainly rodents, and 3 maps of distribution of certain trees or plants (lodgepole pine, common yucca, tree cactus) in Colorado] [1:6,500,000 approx. (1 in.=103 miles approx.)]. Accompany, as separate plate and as Figs. 2 to 28 (excepting Figs. 15 and 20), 30, 33 and 37, "A Biological Survey of Colorado" by Merritt Cary, *North American Fauna*, No. 33, Biol. Surv., 1911.

NORTH AMERICA

UNITED STATES

CALIFORNIA. [19 outline county maps of California showing railroads and stage lines with distances between points, *viz.*:] Del Norte and Siskiyou; Modoc and Lassen; Shasta and Tehama; Humboldt and Trinity; Mendocino, Glenn Lake and Colusa; Butte and Plumas; Sutter, Yuba, Sierra, Nevada, Placer and El Dorado; Sonoma, Marin, Napa, Yolo and Solano; Sacramento, San Joaquin, Amador and Calaveras; San Francisco, San Mateo, Contra Costa, Alameda, Santa Clara and Santa Cruz; Stanislaus, Merced, Tuolumne and Mariposa; Madero and Fresno; King's, Tulare and Kern; Alpine, Mono and Inyo; San Benito and Monterey; San Luis Obispo; Santa Barbara and Ventura; Los Angeles and Orange; San Bernardino; Riverside, San Diego and Imperial. [Scales varying from 1:1,500,000 to 1:2,000,000 approx. (1 in.=24 to 32 miles approx.)] Brought down to Jan. 1, 1909. Accompany, on pp. 95-115, "Mineral Productions, County Maps and Mining Laws of California," *Bull.* No. 60, California State Mining Bureau.

NEW YORK. Sketch Map of the S. E. Adirondack region showing the relation of the pre-glacial drainage to that of the present. [1:700,000 approx. (1 in.=12.5 miles approx.)]. [43°50' - 42°45' N.; 73°20' - 73°20' W.] Accompanies, as Fig. 1 on p. 178, paper on "Pre-Glacial Course of the Upper Hudson R." by W. J. Miller, *Bull. Geol. Soc. Amer.*, Vol. 22, pp. 177-186, 1911.

NEW YORK CITY. The New Standard Map of Greater New York. Scale 4 inches to 1 mile (1:15,840). (40°55' - 40°30' N.; 74°17.3' - 73°40.0' W.) 15 sheets. Rand, McNally & Co., Chicago and New York. Originally published about 1903. \$30.00. [Also issued in an edition in which a separate map, usually on a reduced scale, is given to each borough or suburban district, price 50 cts. unmounted and folded in cardboard covers, or \$1.50 on heavy paper and mounted on rollers. Except in the 15-sheet edition it is kept up to date. The smaller-scale maps of the borough edition, unmounted, are best for close consultation and the larger-scale edition, on rollers, for use as a wall-map. The separate maps are:] (1) Manhattan, 4 in.=1 mile and 2½ in.=1 mile (1:25,344); (2) Brooklyn, 3 in.=1 mile (1:21,120) and 2½ in.=1 mile; (3) Bronx 3½ in.=1 mile (1:18,100); (4) Queens, 2½ in.=1 mile; (5) Richmond, 3 in.=1 mile; (6) Hoboken, Jersey City and Bayonne, 3 in.=1 mile; (7) Newark, Belleville, Bloomfield, etc., 3 in.=1 mile.

The map represents conditions as they are, shows only existing streets, and thus avoids the common error in most city maps of not distinguishing between streets actually built and those projected. The map is based on original material, as maps issued by city departments, etc. It shows that neatness and clearness of line which is the sign of the skilled draftsman's work. The symbols for street-car and elevated subway lines, for example, are so well chosen that, when superimposed, they clearly convey the meaning that both a street-car and an elevated or a subway line, as the case may be, follow the same street. The map has been reproduced by a photographic process which faithfully renders the careful delineation of the original. This is a great advance over the wax-engraving process. It is essentially a black-and-white map. Color overprints have been used (as green, for parks and cemeteries), without grasping, however, the possibility which color-printing affords for a wider range of expression and greater clearness. This advantage would have been realized if, for instance, areal coloring had been used to show built-up areas. In this respect the map falls farthest short of fulfilling one of the principal requirements of an ideal city map. Representing the built-up areas in color (aside from its anthropo-geographic value) would have allowed drawing the streets in their proper width, as their names, printed in black, could then be extended beyond the street limits without impairing legibility. City blocks might also have been drawn to scale, and the fact that this was not done makes it difficult or impossible to use the map for statistical purposes.

Color-printing has been used intelligently on the $2\frac{1}{2}$ -inches-to-the-mile map of Brooklyn, on which the routes of surface-car lines have been made more salient by overprinting in red—a feature which could be introduced to advantage on other maps of the series. In spite of these criticisms, the Standard Map of Greater New York is by far the best general map of New York City we have. It is indicative of advance in the right direction.

[Distinguishes between: Igneous Rocks; Lower Paleozoic, Carboniferous (four sub-divisions), Cretaceous, Tertiary, and Sand Hills.]

OKLAHOMA. Progress Geological Map of Oklahoma. Prepared by Chas. N. Gould, Director, Oklahoma Geological Survey, 1911. [1:1,000,000 approx. (1 in.=15.8 miles approx.).] Black. Accompanies "Brief Statement of the Geological History of Oklahoma," by C. N. Gould, *Circular* No. 2, Okla. Geol. Surv., Norman, July, 1911.

WASHINGTON. Geologic Map of Blewett District. By C. E. Weaver, assisted in the field by C. R. Fetteke. [1:21,120 (1 in.= $\frac{1}{2}$ mile).] $47^{\circ}25'$ N. and $120^{\circ}40'$ W. 11 colors. With three sections. Accompanies, as Pl. I, "Geology and Ore Deposits of the Blewett Mining District," by C. E. Weaver, *Bull.* No. 6, Washington Geol. Surv., 1911.

CANADA.

ALBERTA. Topographical Sketch of a Portion of Jasper Park, Alberta. [1:180,000 approx. (1 in.=2.8 miles approx.).] Accompanies, as Fig. 6 on p. 160, report on "Coal Fields of Jasper Park," by D. B. Dowling, pp. 150-168, *Summary Report* for 1910, Geol. Surv. of Canada [Publ. No. 1170].

[Region near exit of Athabasca R. from Rocky Mts. Photograph of a relief model.]

BRITISH COLUMBIA. Sketch Map Showing Mineral Locations, Atlin Mining District, B. C. [1:800,000 approx. (1 in.=12.6 miles approx.).] $60^{\circ}10'$ - $59^{\circ}0'$ N.; $135^{\circ}12'$ - 133° E. Accompanies, as Fig. 1, facing p. 36, report on "Portions of Atlin District," by D. D. Cairnes, pp. 27-58, *Summary Report* for 1910, Geol. Surv. of Canada [Publ. No. 1170].

BRITISH COLUMBIA. Sketch Map of Portland Canal Mining District. [1:1,200,000 approx. (1 in.=18.9 miles approx.).] 56° N. and 130° W. 4 colors. Accompanies report on "Portland Canal District," by R. G. McConnell, pp. 59-89, *Summary Report* for 1910, Geol. Surv. of Canada [Publ. No. 1170].

BRITISH COLUMBIA. Map of Vale District and Portion of Adjacent Districts, British Columbia. Compiled and Drawn in the Lands and Works Department, Victoria, B. C. 1910. [1 in.=8 miles (1:506,880).] $53^{\circ}10'$ - $49^{\circ}0'$ N.; $122^{\circ}10'$ - $117^{\circ}30'$ W. 2 colors.

[No relief. Drainage in blue. Roads and trails shown. Boundaries of land divisions in red. This map is issued at regular intervals. Its value lies in its large scale.]

CANADA. Mineral Map [of Canada]. Scale 100 miles to one inch (1:6,336,000). 4 colors. Mineral information corrected to date by the Geological Survey, Dept. of the Interior, [Ottawa], 1911.

[New edition of this standard map.]

NEW BRUNSWICK AND QUEBEC. (a) Sketch Map of Dalhousie showing the relation of the eruptive mass and its apophyses to the Devonian marine sediments. [No scale]. $48^{\circ}0'$ N. and $66^{\circ}20'$ W.]. 2 colors. (b) Sketch map of the Devonian fish locality at Migouasha [=Maguasha]. [No scale]. $48^{\circ}5'$ N. and $66^{\circ}15'$ W.]. 2 colors. (c) [Chart of] Magdalen Islands, Gulf of St. Lawrence. [1:380,000 approx. (1 in.=5.9 miles approx.).] $48^{\circ}0'$ - $47^{\circ}0'$ N.; $62^{\circ}20'$ - $60^{\circ}45'$ W. [Reduction of chart published July 1888 (corrections Oct. 1908) by U. S. Hydrographic Office]. Accompany, as Plates 4 and 9, facing pp. 126 and 128, "Notes on the Geology of the Gulf of St. Lawrence" and as Plate 2, facing 136, "Observations on the Magdalen Islands" by J. M. Clarke, *New York State Museum Bull.* 149, pp. 121-133 and 134-155, 1911.

SASKATCHEWAN. Indexed Pocket Map of Saskatchewan accompanied by reference index. 22 miles = 1 inch (1:11,393,920). $56\frac{3}{4}^{\circ}$ - 49° N.; 110° - 101° W. 5 colors. Rand, McNally & Co., Chicago, 1911.

[Of the usual type of wax-engraved maps compiled from the commercial point of view. Railroads shown to date.]

SOUTH AMERICA

BRAZIL. Sketch Map of the Approximate Limestone Areas of the Interior of Bahia, Brazil. By J. C. Branner. [1:2,000,000 approx. (1 in.=31.6 miles approx.).] 9° - 12° S.; $43^{\circ}10'$ - $39^{\circ}10'$ W. Accompanies, as Pl. 14, facing p. 187, paper on "Aggraded Limestone Plains of the Interior of Bahia, Brazil," by J. C. Branner, *Bull. Geol. Soc. Amer.*, Vol. 22, pp. 186-206, 1911.

BRAZIL. Map to illustrate a paper on the Geography of North Eastern Bahia by J. C. Branner. 1:2,500,000, or 1 in.=39.46 miles. $8\frac{1}{2}^{\circ}$ - $13\frac{1}{2}^{\circ}$ S.; $42^{\circ}5,6'$ - $35\frac{1}{2}^{\circ}$ W. 1 color. Accompanies first part of paper with above title by same author, *Geogr. Journ.*, Vol. 38, pp. 139-152, 1911.

BRITISH GUIANA. British Guiana to illustrate a paper by J. A. J. de Villiers. 1:2,000,000, or 1 in. = 31.56 miles. 9° — 3° N.; 63° — 57° W. 4 colors. With inset: A reproduction of Horstman's map, reduced. Accompanies paper on "The Foundation and Development of British Guiana" by the same author, *Geogr. Journ.*, Vol. 38, pp. 8-26, 1911.

[Relief in brown shading. Shows route followed by Horstman in 1739].

CHILE. Region Salitrera de Chile comprendida entre El Toco i Copiapó. Mapa construido en vista de recientes mensuras i completado con los trabajos topográficos de la Oficina de Limites por Jorge J. Heusler, 1907. 4 sheets. 1:500,000 (1 in. = 7.89 miles). 22° — 28° S.; 71° — 67° W. 6 colors. With list of "Nómina de las Compañías Salitreras."

[Valuable because of relatively large scale. Relief in brown shading, nitrate deposits (*salares*) in blue. Symbols for gold, silver and copper mines. Roads and railroads in black, telegraph lines in red.]

AFRICA

ABYSSINIA. Recent Surveys in Southern Abyssinia. 1:2,000,000, or 1 in. = 31.56 miles. 10° — 3° N.; 33° — 43° E. 2 colors. With inset "Chart of Triangulation and Latitude and Azimuth Traverses", 1:6,000,000, and Table of Positions. Accompanies "A Journey in Southern Abyssinia" by C. W. Gwynn, *Geogr. Journ.*, Vol. 38, pp. 113-119, 1911.

[Relief in brown shading; drainage in blue. Valuable: embodies results of original surveys.]

BELGIAN CONGO. Chart of the River Aruwimi. From a Survey by Robt. L. Reid, 1908-10. 1:250,000, or 1 in. = 3.95 miles. $1^{\circ}59'$ — $1^{\circ}13'$ N.; $23^{\circ}35'$ — $27^{\circ}42'$ E. In three sections. 1 color. With inset map of "Part of Central Africa to serve as an index to Mr. R. L. Reid's Survey" showing position of sections, 1:500,000, or 1 in. = 78.91 miles. 3° N.— 3° S.; 23° — $33\frac{1}{2}^{\circ}$ E. 1 color. Accompanies "The River Aruwimi" by R. L. Reid, *Geogr. Journ.*, Vol. 38, pp. 29-34, 1911.

FRENCH SOMALI COAST. Carte de la Côte Française des Somalis et Régions Avoisinantes. Dressée par A. Meunier d'après les itinéraires parcourus par tous les principaux explorateurs, la carte italienne de la Colonie de l'Erythrée et régions adjacentes, la carte anglaise du Somaliland, les cartes marines françaises et anglaises. Service géographique et des Missions, Ministère des Colonies. (a) Feuille No. 2: Harrar. $10^{\circ}45'$ — $10^{\circ}30'$ N.; $41^{\circ}32.5'$ — $45^{\circ}5'$ E. With two insets: (1) Plan de Djibouti d'après le Service des Travaux Publics et la Carte du Service Hydrographique de la Marine. 1:200,000 (1 in. = 6.32 miles). (2) Plan d'Harar d'après M. M. Paulitschke et Monden-Vidaïhet. 1:200,000. (b) Feuille No. 3: Addis-Ababa. $10^{\circ}30'$ — $8^{\circ}30'$ N.; $38^{\circ}48'$ — $41^{\circ}30'$ E. With inset: Plan de Addis-Ababa et de ses environs d'après les travaux les plus récents. 1:100,000 (1 in. = 11.8 miles). Both maps (a) and (b): 1:500,000 (1 in. = 7.89 miles). 4 colors.

[Relief in brown generalized contours, drainage in blue, separate symbols in green for meadowland, forests and fields. Valuable basal map. Sheet 1 (Djibouti) completes the map].

FRENCH WEST AFRICA. Carte de l'Afrique Occidentale Française. 2^e édition 1910. Service Géogr. des Colonies. Feuille No. 2. Tombouctou. 1:2,000,000 (1 in. = 31.56 miles). 20° — $11\frac{1}{2}^{\circ}$ N.; $7^{\circ}40'$ W.— $4^{\circ}20'$ E. 4 colors.

[Relief in brown generalized contours, drainage in blue, routes in red. Valuable basal map. Other sheets are: Dakar, Zinder, Konakry, Bingerville-Porto Novo, Forcados].

FRENCH WEST AFRICA. Carte du Réseau Complet des Chemins de Fer Projetés en A. [Afrique] O. [ccidentale] F. [rançaise]. [1:11,300,000 approx. (1 in. = 178.3 miles approx.)]. [19° — 3° N.; 19° W.— 6° E.]. Accompanies on p. 231 "L'Essor de l'Afrique Occidentale Française" [by M. Ponty], *L'Afrique Franç.*, Vol. 21, pp. 229-240, 1911.

GERMAN EAST AFRICA. (a) Karte des besiedelten Gebietes der Landschaft Turu. Hauptsächlich nach den Aufnahmen des Majors v. Prittwitz u. Gaffron, 1903-1905, und mit Benutzung der Aufnahmen von Dr. Baumann, Dr. Dantz, Ltn. Glauning, W. Janke, Hptm. Podlech, Hptm. Ramsay, Hptm. Seyfried, Ltn. Stadlbauer, Dr. Stuhlmann, Dr. Tornau, Oberstlt. v. Trotha, Ltn. Werther bearbeitet unter Leitung von P. Sprigade von R. Schultze. 1:100,000 (1 in. = 1.58 miles). $4^{\circ}30'$ — $5^{\circ}16.4'$ S.; $34^{\circ}42'$ — $35^{\circ}17'$ E. 4 colors. (b) Skizze von Unjangwira (Bezirk Tabora) und den Nachbarlandschaften. Nach eigenen Aufnahmen (Dez. 1909-Jan. 1910) konstruiert, gezeichnet und in den Rahmen der Karte 1:300,000 eingepasst von Major v. Prittwitz u. Gaffron. 1:300,000 (1 in. = 4.73 miles). [$5\frac{1}{2}^{\circ}$ — $6\frac{1}{2}^{\circ}$ S.; $33\frac{1}{2}^{\circ}$ — 34° E.]. 1 color. With "Militärgeographische Erläuterungen" and "Tabelle der Marschstrecken". Accompany, as Karte 4, "Begleitworte zur Karte von Turu (Nr. 4)" and, as Karte 5, "Begleitworte zur Karte von Unjangwira (Nr. 5)", both by Major v. Prittwitz, *Mitt. aus den deutschen Schutzgeb.*, Vol. 24, pp. 188-192 and 182-186, 1911.

[Relief on maps (a) and (b) in approximate contours in brown. On map (a) boundaries of natural provinces in red. Map (a) is an original map of the usual excellence of German colonial maps published in the *Mitteilungen*. Map (b) furnishes the first authentic information about a hitherto unexplored region.]

MOROCCO. Le Port d'Agadir. [1:36,000 approx. (1 in. = 0.57 mile)]. [$9\frac{1}{2}^{\circ}$ W. and $30\frac{1}{2}^{\circ}$ N.]. Accompanies on p. 265 "L'affaire d'Agadir et les négociations franco-allemandes", *L'Afrique Franç.*, Vol. 21, pp. 264-267, 1911.

MOROCCO. (a) Agadir und Umgebung. 1:20,000 (1 in. = 0.32 miles). (b) Tiefenverhältnisse der Bucht von Agadir. 1:100,000 (1 in. = 1.58 mile). Accompany, as text figures, "Agadir, die Hauptzugangspforte zum Sus" by M. Hübner, *Pet. Mitt.*, Vol. 57, II, pp. 111-112, 1911.

TUNIS-TRIPOLIS. The Tunis-Tripolis Frontier, as laid down by the Joint Commission of 1910. 1:5,000,000, or 1 in. = 78.91 miles. 35° — 30° N.; $8\frac{1}{2}^{\circ}$ — $13\frac{1}{2}^{\circ}$ E. Accompanies note with same title, *Geogr. Journ.*, Vol. 38, pp. 74-75, 1911.

ASIA

JAPAN. (a) Map showing Relation of Volcanic and Seismic Phenomena in West Hokkaido. [1:1,350,000 approx. (1 in. = 68.7 miles approx.)]. [46° — 41° N.; 139° — 146° E.]. Black. (b) Map showing the Topographical Features of the Utsunomiya and the Vicinity. [1:150,000 approx. (1 in. = 2.5 miles approx.)]. [42° — 32° N. and 140° — 50° E.]. Black. [Relief in contours: above 100 meters, interval 100 meters.] (c) Topographical Map of the Northern Flank of the Utsunomiya, showing the Distribution of the 45 Craterlets and the Locality of the Mountain Elevation. [1:18,000 approx. (1 in. = 0.28 mile

approx.). 3 colors. [Relief in contours: interval 20 meters]. Accompany, as Figs. 1, 2 and 4, "The Uzu-san Eruption and Earthquake and Elevation Phenomena" by F. Omori, *Bull. Imp. Earthq. Investig. Comm.*, Vol. V, No. 1, Tokyo, June 1911.

TURKEY IN ASIA. Zweite Reise in der Asiatischen Türkei 1899 von Dr. Max Freiherrn v. Oppenheim. Blatt I: Von Ba'albek nach Haleb. 1:600,000 (1 in.=9.47 miles). 36° 15' - 33° 45' N.; 35° 0' - 37° 25' E. 3 colors. With two insets (enlargements of parts of the main map): (1) Reise-Route zwischen Hums und Hamah. 1:300,000 (1 in.=4.73 miles). 35° 7½' - 34° 35' N.; 35° 2½' - 36° 42½' E. 3 colors. (2) Kartenskizze der antiken Ruinenorte in der Umgegend von Ba'albek. 1:300,000. 34° 7' - 33° 48' N.; 35° 53' - 36° 18' E. 3 colors. Accompanies, as Taf. 11, note with similar title, *Pet. Mitt.*, Vol. 57, 11, p. 81, 1911.

[Relief in brown shading, route in red.]

AUSTRALIA

AUSTRALIA. (a) Sketch Map of N. E. Australia Showing the Area with Flowing Wells and the Distribution of the Supposed Intake Beds in Queensland. 1:15,000,000, or 1 in.=236.74 miles. 140° - 32° S.; 137° - 154° E. (b) Sketch Map of the Murray and Darling Rivers showing the position of the gauging stations and the southern border of the artesian area. 1:10,000,000, or 1 in.=157.83 miles. 26° - 37° S.; 139° - 151° E. (c) The Northern Outcrop [of Blythesdale Braystone]. 1:3,000,000, or 1 in.=47.34 miles. [17½° - 21° S.; 141° - 144½° E.] (d) The Jericho and Aramac Outcrops. 1:1,000,000 (1 in.=15.78 miles) [22½° S. and 145½° E.] (e) The Series of Southern Outcrops. 1:3,000,000. [24½° - 27° S.; 146° - 149° E.] (f) The Southeastern Outcrop. 1:1,000,000 [27° S. and 151° E.] (g) Sketch Map of Some of the Wells in Queensland with a Diminished Flow, or which have ceased to flow. 1:12,500,000, or 1 in.=197.25 miles. 17° - 29½° S.; 137° - 151° E. (h) Geology of the Eastern Margin of the Artesian Area near Hughenden after Maitland (1838) Showing the Distribution of the Extinct Volcanic Vents in the Area of High Potential. 1:1,000,000, or 1 in.=31.56 miles. [19½° - 21½° S.; 143° - 145½° E.] (i) Map Showing the Variation in Salinity of the Queensland Well Waters. 1:5,000,000, or 1 in.=78.91 miles. 16½° - 29½° S.; 137½° - 153° E. Accompanying, as Figs. 1, 2, 3A, 3B, 3C, 3D, 5, 10 and separate plate, paper on "The Flowing Wells of Central Australia" by J. W. Gregory, *Geogr. Journ.*, Vol. 38, pp. 34-59 and 157-181, 1911.

WESTERN AUSTRALIA. The Wiluna-Kimberley Stock Route by A. W. Canning, 1906-07. 1:1,000,000, or 1 in.=15.78 miles. 18° 8' - 26° 50' S.; 120° 0' - 128° 30' E. In four sections. With inset map of Western Australia, 1:25,000,000, showing position of sections. 3 colors. Accompanies "Mr. Canning's Expeditions in Western Australia, 1906-07 and 1908-10," *Geogr. Journ.*, Vol. 38, pp. 26-29, 1911.

EUROPE

ALPS. Sketch-map of the four great "Rock-groups" of the Alps. (After Professor Steinmann.) [1:3,800,000 approx. (1 in.=60.0 miles approx.).] [48° - 45½° N.; 5½° - 14° E.] Black. Accompanies, on p. 400, paper on "The Architecture and Origin of the Alps" by James Geikie, *Scott. Geogr. Mag.*, Vol. 27, pp. 393-417, 1911.

GERMANY. Die Provinzen Posen und Westpreussen unter besonderer Berücksichtigung der Ansiedlungsgüter und Ansiedlungen, Staatsdomänen und Staatsforsten nach dem Stande vom 1. Januar 1911. 10. Auflage. Bearbeitet auf Grund amtlicher Angaben. Auf Vogels Karte des Deutschen Reiches in 1:500,000 (1 in.=7.89 miles). 54°23' - 51° 7' N.; 15° 5' - 17° 40' E. 7 colors. Accompanies, as Taf. 1, Vol. X, *Deutsche Erde*, 1911.

GERMANY. (a) Übersichtskarte der Siedelungsverteilung im Odenwald. 1:250,000 (1 in.=3.95 miles). [49°55' - 49°25' N.; 8°36' - 9°10' E.] (b) Karte zur Siedelungsgeographie des Odenwaldes. 1:100,000 (1 in.=1.58 miles). [Same coordinates] 8 colors. Accompany paper on "Die Ortschaften des Odenwaldes nach Lage und Gestalt" by A. Jungk, *Geogr. Mitt. aus Hessen*, VI. Heft, pp. 1-70, 1911.

GERMANY. (a) Übersicht der Höhenschichtkarte des Grossherzogthums Hessen im Massstabe von 1:25,000. 1:500,000 (1 in.=7.89 miles). 50°54' - 49°12' N.; 7°50' - 9°40' E. (b) Übersicht der veröffentlichten Messtischblätter [of Prussia] 1:25,000. Blatt 3. [1:1,000,000 (1 in.=15.78 miles).] 53°0' - 49°48' N.; 5°50' - 14°20' E. Accompany "Neuere Beiträge zur Landeskunde von Hessen: Kartographie und Führerliteratur" by W. Diemer, *Geogr. Mitt. aus Hessen*, VI. Heft, pp. 79-118, 1911.

[Copies of the official index maps.]

OCEANOGRAPHICAL.

ATLANTIC OCEAN. Verbreitung der atlantischen Süsswasser-Aale. Mercator projection: equatorial scale 1:50,000,000. 63° N. - 6° S.; 102° W. - 37° E. 2 colors. Accompanies, as Taf. 15, paper on "Die Verbreitung der Flussale," *Pet. Mitt.*, Vol. 57, 11, pp. 71-73, 1911.

[Shows coasts along which fresh-water eels are found and their spawning grounds. Indicates isotherms of the ocean at the depth of 1,000 meters.]

MALAY ARCHIPELAGO. Linien gleicher Gezeitenphase im Ostindischen Archipel. [Compiled by] Dr. J. P. van der Stok. 2 maps: (a) M₂ Tide. (b) K₁ Tide. [Mercator projection: equatorial scale 1:28,000,000 approx.] 10° N. - 15° S.; 90° - 140° E. Accompany, as Taf. 24, "Elementare Theorie der Gezeiten" by J. P. van der Stok, translated by E. Herrmann, *Ann. der Hydrogr.*, Vol. 39, pp. 354-373, 1911.

RUSSIAN COASTS. [Six charts, viz.:] (a) Balaklava Bay, S. W. Coast of Crimea, Black Sea. Compiled, 1910, from surveys by the transport *Kasbek*, 1909; supplemented by recent data. 1:2100 (1 in.=0.03 miles). 44°30' N. and 33°36' E. Chart No. 780. (b) Gridina Bay, Karelian Coast, White Sea. 65°58' - 66°51½' N.; 34°38' - 34°53' E. Chart No. 778. (c) Pongama Bay, Karelian Coast, White Sea. 65°21½' - 65°18½' N.; 34°16' - 34°44½' E. Chart No. 771. (d) Solovetzkii Bay, Onega Bay, White Sea. 65°3' - 64°56' N.; 35°33' - 35°47' E. Chart No. 775. (e) Kuzov Island, Onega Bay, White Sea. 64°50' - 64°53' N.; 34°50' - 35°20' E. Chart No. 777. (Maps (b), (c), (d) and (e): Compiled 1910 from results of the special survey of the White Sea 1889 to 1909; supplemented by recent

data. 1:21,000 (1 in.=0.33 miles). (f) From Pechora Bay to Yugor Strait, Samoyedes Coast, Arctic Ocean. Compiled 1910 from the surveys of Ivanov, 1826, and of the Hydrographic Expedition to the Arctic Ocean, 1878-1904; supplemented by recent data. 1:168,000 (2.65 miles). 69°43' - 68°50' N.; 57°50' - 60°30' E. Chart No. 772. Published by the Chief Hydrographic Office, Ministry of the Marine. St. Petersburg, 1910. [In Russian.]

SIBERIAN COASTS. [Two charts:] (a) The Gulfs of Obi and Yenisei. Kara Sea. Compiled 1910 from surveys 1828-1909; supplemented by recent data. 1:1,050,000 (1 in.=16.57 miles). 75°-66° N.; 65°-84° E. With inset: Dickson Island, 1:168,000 (1 in.=2.65 miles). 73° 30' W.; 80° 27' E. Chart No. 763. (b) Yama Bay, Sea of Okhotsk. Compiled 1910 from surveys of the Hydrographic Expedition to the Eastern Ocean, 1908; supplemented by former and recent data. 1:292,152 (1 in.=4.61 miles). 60° 0' - 58° 30' N.; 153° 30' - 157° 0' E. Chart No. 770. Published by the Chief Hydrographic Office, Ministry of the Marine, St. Petersburg, 1910. [In Russian.]

HISTORICAL.

ITALY. (a) Leonardo da Vinci: Pianta d'Imola. (Biblioteca del R. Castello di Windsor.) (b) Pianta Topografica della Città d'Imola. [Both plans 1:4,260 approx. (1 in.=0.7 mile approx.).] Accompany, as Tav. I and II, "La Pianta d'Imola di Leonardo da Vinci," by Mario Maratta, *Boll. della Soc. Geogr. Italiana*, Vol. 12, pp. 945-967, 1911.

[Map (a), a facsimile of a MS. map by Leonardo da Vinci of the town of Imola, lying 20 miles E. S. E. of Bologna. Map (b), added for comparison, is modern, based on a plan on the scale of 1:2,670 by R. Foschi.]

NORTH AND SOUTH AMERICA. Persistence of the Idea of North America as a Group of Islands. 2 plates. Pl. I, 1502-1514. Pl. II, 1520-1622. 4 colors. Accompany, facing p. 3, "California under Spain and Mexico, 1535-1847," by I. B. Richman, 1911.

[Superimposed outlines in color of North and South America according to old maps representative of the geographic knowledge of their time.]

PACIFIC OCEAN. Routes of Galleons in the Pacific as Noted in their Log Books. [Mercator projection; equatorial scale 1:117,000,000 approx.]. Accompanies, as Chart I, facing p. 12, "California under Spain and Mexico, 1535-1847," by I. B. Richman, 1911.

[Shows individual tracks of six galleons between 1565 and 1743.]

UNITED STATES. Map of Twenty-two Spanish and American Trails and Routes Affecting California, 1694-1840. Scale 55½ miles to one inch (1:3,516,480). 51°-21° N.; 125°-103° W. Accompanies, in pocket, "California under Spain and Mexico," by I. B. Richman, 1911.

CARTOGRAPHICAL.

WORLD. Isogonenkarte in besonderer Projektion. Von Dr. H. Maurer, 3 colors. Accompanies, as Taf. 15, paper on "Neue Weltkarte zur Darstellung der Isogonen," by the same author, *Pet. Mitt.*, Vol. 57, II, pp. 91-92, 1911.

[The world drawn on a conventional projection based on the stereographic, which represents the two hemispheres as if they were two elastic balls pressed against each other. Valuable in affording a survey of the isogonal lines over the whole earth. It brings out clearly the relationship of the astronomical and magnetic poles. This is not possible on the Mercator projection, which is usually employed.]

EDUCATIONAL.

(a) Physical Map of North America. 104 miles=1 inch (1:6,589,440). 44 x 66 inches. (b) Physical Map of the United States. 53 miles=1 inch (1:3,358,080). 66 x 46 inches. Both mounted on cloth, with rollers. The Rand-McNally Series of Physical Wall Maps. Rand, McNally & Co., Chicago and New York. Each \$8.

On the map of North America relief is expressed, on land, by four tints: cream for elevations under 1,000 ft., yellow for elevations of 1,000-3,250 ft., buff for 3,250-6,500 ft., and brown for those above 6,500 ft.; on sea, by three tints of blue, increasing in intensity, for depths under 650 ft., from 650 to 6,500 ft. and over 6,500 ft. On the map of the United States seven tints based on the same color scheme are used to express land relief, one each for elevations of 0-100 ft., 100-500 ft., 500-1,000 ft., 1,000-2,000 ft., 2,000-5,000 ft., 5,000-8,000 ft., and above 8,000 ft. Ocean depths are shown in the same way as on the map of North America. On both maps mountains are represented in black hachures. Rivers are in black, with a wider overprint in blue, and are accompanied by a statement of their length. On the map of North America are shown the northern limits of forest trees, of cereals, of the vine and maize and of cotton; the -30°, 0°, 30°, 60° and 80° isotherms for January, the 40°, 60° and 80° isotherms for July, together with warm and cold ocean currents in July. Both maps bear nomenclature and display a great wealth of place names.

In this last feature the misconception which underlies the preparation of these maps as to the purpose of a wall map is most evident. They show a lack of appreciation of the fact that a wall map should convey its information at a distance and must therefore be drawn according to totally different methods from those used on a map intended for close consultation. Even if it be granted that some names are desirable to guide the lecturer the uncritical sense evidenced in the inclusion of a great number of irrelevant names is, particularly in matters pedagogic, greatly to be deplored.

As to the validity of the statement on the maps themselves that they are "compiled from the latest and most authentic surveys" and of that in the catalog describing them (p. 10) to the effect that in their preparation "the latest official information and results of the most recent explorations have been utilized. They tell the truth," judgment may be had by examining on the map of North America, for instance, southern Alaska where Mt. McKinley has seemingly been added as an afterthought and bears no relation to the Alaskan range ("Alaska Mts." on the wall map) of which it actually forms the culmination, or, again, the Canadian Rockies with regard to which is still retained the legend, long discredited, of the altitude of Mts. Brown and Hooker (credited with 16,000 and 15,000 ft. respectively), or on the map of the United States the obsolete delineation of the lower Salmon River.

The pressing need of adequate school maps of our continent and country and its various sections on a larger scale than, but of equal quality to the standard school wall maps published abroad, has

not been met by these maps. We must still turn to such products as Gaebler's *Schulwandkarte von Nord Amerika*, 1:4,500,000, physical edition, published by Georg Lang, Leipzig (probably the best physical wall map of North America because of its large scale and its efficient method of representation), or the physical wall map of Canada (Philip's Comparative Series), 1:3,000,000, published by George Philip & Son, London, or Diercke's physical wall map of the United States and Mexico, 1:3,000,000, published by George Westermann, Braunschweig, if we wish to make use of the best material available for teaching purposes.

The other maps of this series include the other continents, except Australia, and a map of the world on Mercator's projection. The above remarks are equally applicable to them.

OTHER ACCESSIONS

SEPTEMBER, 1911

AMERICA

(The size of books is given in inches to the nearest half inch.)

FAWCETT, WILLIAM and RENDLE, ALFRED BARTON. *Flora of Jamaica*. Containing Descriptions of the Flowering Plants Known from the Island. With Illustrations. Vol. 1 *Orchidaceæ*. With thirty-two plates. London, the British Museum, 1910. 9 x 5½. *Gift*.

FIGORE, PASQUALE. Remarks on the Arbitral Sentence Pronounced by the President of the Argentine Republic on July 9, 1909, on the Boundary Question between Bolivia and Peru. Translated from the French by Fanny Bandelier. From the *Revue Générale de Droit International Public*. New York, [1911?]. 9 x 6 (pamphlet).

VOLK, ERNEST. The Archæology of the Delaware Valley. With 2 maps, 125 plates and 26 ills. in the text. Papers of the Peabody Museum of Archæology and Ethnology, Harvard University. Vol. V. Cambridge, Mass. The Museum, 1911. 9½ x 6½. *Gift*.

— Early Spanish Voyages to the Strait of Magellan. Translated and edited, with a Preface, Introduction and Notes by Sir Clements Markham. (Maps and ills.) London, The Hakluyt Society, 1911. 9 x 5½.

AFRICA

BOULENGER, GEORGE ALBERT. Catalogue of the Fresh-Water Fishes of Africa, in the British Museum (Natural History). Volume II. (Ill.) London, The British Museum, 1911. 11 x 7½. *Gift*.

ASIA

— Catalogue of Maps published by the Survey of India. Corrected up to the 1st of February, 1910. Published under the direction of Colonel F. B. Longe, Surveyor General. Calcutta, The Government, 1910. 14 x 11. *Gift*.

— Extracts from Narrative Reports of Officers of the Survey of India for the Season of 1908-09. Prepared under the direction of Col. F. B. Longe, Surveyor General of India. I. The Magnetic Survey of India; II. Tidal and Levelling Operations; III. Pendulum Operations; IV. Triangulation in India. Calcutta, The Government, 1911. 13 x 8. *Gift*.

AUSTRALIA

— Year-book of Australia for 1911 (Maps and illustrations). Sydney, The Year-book of Australia and Publishing Co. 1911. 8½ x 5.

EUROPE

— A Reproduction of the Tablet Erected in Bristol Cathedral (1910) to the Memory of Richard Hakluyt. Born 1522. Died 1616. London, The Hakluyt Society, 1911. 9 x 5½.

— Statistisches Jahrbuch für das Grossherzogtum Baden. Achtunddreissigster Jahrgang, 1910 und 1911. Karlsruhe, Macklot'sche Druckerei, 1911. 11 x 7½. *Gift*.

GENERAL

EDLER, FRIEDRICH. The Dutch Republic and the American Revolution. Johns Hopkins University Studies. Series XXIX. No. 2. Baltimore, The John Hopkins Press, 1911. 10 x 6.

HARTMEYER, DR. R. (Berlin). Die Ascidien der Deutschen Südpolar-Expedition, 1901-1903, von —. Mit Tafeln XLV-LVII und 14 Abbildungen im Text. Deutsche Südpolar Expedition, 1901-1903. Herausgegeben von Erich von Drygalski, Leiter der Expedition. XII. Band. Zoologie IV. Band. Heft V. Berlin, Georg Reimer, 1911. 14 x 10. *Gift from the Imperial German Foreign Office*.

[J. E. WORCESTER. Modern Atlas (8 maps) to accompany Elements of Geography, Ancient and Modern, by —]. (Boston, Cummings and Hilliard) [1819?]. 9½ x 6. No front cover or title. Maps of the World and of Africa missing. *Gift from W. Churchill*.

— The American Catalog. 1908-1910. New York, *The Publishers' Weekly*, 1911. 10½ x 7.

BULLETIN

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NORTHEASTERN CHEHKIANG, CHINA: NOTES ON HUMAN ADAPTATION TO ENVIRONMENT*

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GENERAL FEATURES. (Cf. map, Fig. 1.) Northeastern Chehkiang [Chekiang], a coastal portion of China, south of the mouth of the Yangtze River, is a district of subdued ranges and hills of irregular trends, which has been slightly submerged, thus producing a swarm of islands; and since then its inner waters have been converted into low plains and its landward islands bound together by the alluvial deposits of the Yangtze and other rivers, while the still detached outer islands, known as the Chusan Archipelago, have been cliffed by the sea.

BOUNDARIES. The district has fairly well defined limits. It is roughly rectangular, about 100 miles from east to west, by 50 miles from north to south. It is adjoined on the east and along a third of its northern coast, as far west as the mouth of the Ningpo River, by the Chusan Archipelago. West of the Ningpo River, as the shore bends around a northward salient, the sea narrows into Hangchow Bay. On the west the district is bounded by the north flowing Dzao-ngo [Yenki] River, on the south by the mountainous district of Sing-ts'ông [Sinchang], Dzing-yün and Vong-hwô [Feng-hwa].

* Although not in consonance with the standard system adopted by the Chinese Imperial Post Office the author's rendering of Chinese names has been retained throughout. It is based on local usage and not on the Mandarin, or official, dialect. Wherever possible, however, equivalents have been added in brackets.—ASST. ED.



FIG. 1.—Sketch Map of Northeastern Chehkiang, China. Scale 1:1,160,000 (1 in. = 18.31 miles). Based mainly on the Karte von Ost-China, 1:1,000,000, published by the Prussian General Staff (1901-02), and, in part, on a map drawn by the author. Arrow on inset-map indicates general location of main map. Compiled by W. L. G. J.

MOUNTAINS, PLAINS AND RIVERS. The city of Ningpo lies on a large alluvial plain northeast of the center of the district, at the junction of large streams from the west and southwest whose united waters, forming the Ningpo River, flow northeastward and have the city of Cing-hae [Chin-hai] at their mouth. North of Ningpo and west of Cing-hae, there is the beginning of a range of hills on the coast. This narrow range varies in height up to about 1,500 ft. It continues in almost a straight line due west, broken only by a gap through which the western branch of the Ningpo River runs eastward. There the range turns southward till it is lost in a spur of the mountains of the interior. North of this range, bounded by the sea on the north and northeast and by the Dzao-ngo River on the west, is an alluvial plain called Saen-poh (=North of the Hills). South of the range is the Ningpo Plain. The latter is about 25 miles* in diameter, with the city of Ningpo near its center. It is the heart of the district.

East of the Ningpo Plain, toward the sea, there are again hills, which rise in the northeast to the peak of T'a-bah Saen [Ta-pai Shan] and, in the east, Foh-ziu Saen. These are about 2,000 feet high. They extend northeastward in a slender promontory. East of these hills the country is drained by small streams running directly to the sea; but most of the interior is drained by the Ningpo River. Its southern branch rises in the Vong-hwô hills and runs toward the northeast; the western branch (the Nga-kông [Yau-kiang]) rises in the canal system of the northern plain near the Dzao-ngo River† and flows east-southeast. These two branches join just outside of the Ningpo city walls. The Dzao-ngo, which bounds the district on the west, rises in the hills of Dzing-yün and Sing-t'sông and runs in a northerly direction to Hangchow Bay.

THE PLAINS. It is evident, as stated above, that the plains of this district have been built up among former islands by silt brought down from the interior of China by the great river Yangtze and possibly to some extent by the Dzien-clang [T sien-tang], near the mouth of which lies Hangchow. The southern mouth of the Yangtze opens in a southeasterly direction, giving a tendency to its waters to drift toward Ningpo. The water of Hangchow Bay and of the sea far beyond the islands is yellow and muddy, similar to that of the mouth of the Yangtze.

* If? (9 miles approx.).—ASST. ED.

† This is not in accordance with the Karte von Ost-China (see legend of Fig. 1) on which the western branch of the Ningpo River is delineated as a watercourse connecting the lower Dzao-ngo with the Ningpo at the city of that name, thus making an island of the entire district lying north of it.—ASST. ED.

The plains are literally level. The hills rise so abruptly from the plain that in many cases it would be possible to stand astride the line separating them, with one foot on the unquestionable hill slope and the other on the flat alluvium. Canals on the same level as the rivers often follow near the base of the hills. These canals receive the streams from the hills, yet their waters are quite clear, much more so than that of the flood tide that enters the large rivers from the sea.

Proofs that the action of silting is still going on are numerous. In Saen-poh (the northern plain) there are two villages at the foot of the narrow northern range, one called Tong-bu-deo (=Eastern Landing Stage), the other Si-bu-deo (=Western Landing Stage). The former of these is now about 10 miles* from the sea, the latter 14 or 15 miles†. Similarly, the name of the great city of Shanghai in Kiangsu Province means "On the Sea," but it is now inland. Some of the nearest islands in the Chusan Archipelago may be reached by wading at low water. The seashore is commonly a mud flat. At intervals the inhabitants have raised embankments to reclaim ground from the sea. This is known to have been going on for centuries. During the last six or seven years, at the large fishing village of Ha-pu, at the eastern end of the narrow northern range, the mud flat has been banked up and canals dug out, making an efficient harbor for the fishermen's boats.

THE COAST AND THE SEA. The coast of the plains is low, flat and muddy; but where the hills reach the sea, as well as on the exposed sides of the outlying islands the coast is bold and rocky. The low coast of the plain lends itself very readily to the making of salt. Patches of mud flat are fenced in by embankments, so as to control the inflow of the tide. The sea water then passes in by rather irregular channels, in which most of the mud in suspension settles. It is then allowed to flow over the flat, where it evaporates. After a time a crust of salt forms. This is carefully scraped off and made into a strong muddy brine. The brine is filtered through straw in very primitive filters. It is then again evaporated on shallow wooden trays, and the coarse salt is scraped into baskets.

The sea abounds in fish and other marine animals. Among others may be mentioned several varieties of herring, pomfret and marine eels, together with dog fish, small soles, cuttle fish, clams, prawns, crabs, etc. The fishermen of Ningpo, *i. e.* of the whole Ningpo district, are noted for many miles along the coast^v for their

* Li P (3 miles approx.).—ASST. ED.

† Li P (5 miles approx.).—ASST. ED.

skill. Their boats are made with primitive water-tight compartments. (It is said that the idea of water-tight compartments in modern steamships was first suggested by these boats.) In the summer they keep their fish fresh with ice and send them to the markets of Shanghai and Ningpo by frequent boats. At other times the fish are salted down, with salt procured in the islands, but made on the mainland. The empty shells of a small variety of clams are collected in the islands by boat-loads. These are taken to Ningpo and burnt for lime. A species of sea moss is gathered from rocky shores and eaten by the people. This is one of the numerous auxiliary foods, which the natives eat with their rice.

THE ISLANDS. The largest island in the archipelago is Chusan; it has several plains, three or four miles across, similar to those on the mainland; the sea water around it is muddy. Here the life resembles that about Ningpo: potatoes and other vegetables are produced in abundance; turkeys, geese, fowls and ducks are bred in large numbers. Most of the other islands are small, with few centers of population of more than 300 or 400 inhabitants; some of their people go to the mainland for harvest work, as if their islands were poor and uncultivated. On the outlying islands, cliffed on their exposed coasts, the people are notoriously piratical.

RIVER NAVIGATION. The native boats on the Ningpo River are made with flat bottoms. Shaped in this way they pass over the tidal water with little friction. The larger passenger and freight boats are generally dependent on the wind for their propulsion. When this fails, the boatmen have a large scull at the back, which feathers itself automatically, as it swings backwards and forwards on a pin at the stern. This scull is balanced so exactly that men can work for long periods without tiring. Sculling is not so rapid as sailing with a fair breeze, but as two men, by alternately resting, can keep up sculling for six or eight hours at a time, the distances thus covered are considerable.

Neither scull nor sail is as fast as the tide in the river when it is in full flow, the tidal range being five or six feet. For this reason almost all traveling on the river is done with a favorable tide. One of the most remarkable cases of adaptation in the district is found in connection with the Nga-kông, or western branch of the Ningpo, also called the "Outer River." The city of Yü-yiao [Yü-yao] is about 40 [25?] miles up this branch. This is too long a distance to travel on two tides, unless the wind is favorable.

About two-thirds of the distance to Yü-yiao at a place called Dziang-ding [Chang-ting], a tributary called the Li-kông, or "Inner River," bends back on the north side of the Nga-kông at an acute angle, so that the tributary flows about west. How much of the tributary is natural and adapted and how much is purely artifical, there are no means of knowing. About half way between Ningpo and Dziang-ding a small canal has been made, connecting the tributary with the Nga-kông. Entrance to this is by a *pô*, or haul-over, a Chinese substitute for a lock. Now, a boat leaving Ningpo on the westward flood tide up the Nga-kông finds itself near the haul-over by the time the tide is exhausted. The boat is then drawn over into the canal, which it follows to the tributary, in which it soon finds that the ebb tide is making a favorable current westward. By the time the boat reaches the tributary mouth, the tide has begun to rise again, and advantage can once more be taken of the flood current up the Nga-kông to reach Yü-yiao.

Connecting the Inner River with the Outer River there are two or three other cross canals. The first of these branches off from the Outer River about four miles from Ningpo. For about six months in the year the tide runs in and out of this at will, but in the spring the entrance is blocked up by an embankment. All boats passing in must then cross the haul-over. When this entrance is closed, the only connection with the tidal water is by way of the Inner River at Dziang-ding, a distance of 40 [20?] miles or more. After the first spring rains all the salt water is flushed out of this canal, and fresh water useful for irrigation takes its place. In hot dry summers, as the fresh water in the upper reaches of the river and in the Inner River is used up for irrigation and by its own evaporation, the salt water from the sea gradually passes up the Outer River till it sometimes reaches Dziang-ding. By blocking up its entrance the water in this canal is thus at least kept fresh for the whole of the irrigation season.

A bridge of boats crosses the Ningpo River from outside the Ling-gyiao Gate of Ningpo city to the east bank of the river, and another bridge of boats passes from outside the East Gate to the Foreign Settlement on the north bank. At other places the river is crossed by ferries. Smaller streams are crossed by bridges, some of which have fine arches, twenty or thirty feet above the water. The arches are reached by steps, such as one sees in Chinese pictures.

RIVER FISHING. Advantage is taken of the tides and muddy water in the river to catch fish. Large pocket nets are held in place

by anchored boats. The fish blindly flow into them in the opaque water and are caught in large numbers.

Farther up the river another method of catching fish is used in several places. Pieces of bamboo are chosen long enough to reach to the bottom of the river and to rise one or more feet above the surface. Stones are tied tightly to these near the lower ends. They are then sunk and pushed into the mud. The pulsation of the water with the weight of the stones tends to drive the bamboos deeper, but the stones act as stops, so that they remain firmly anchored. As passing boats push these aside, their weight at the bottom and floating power at the top soon put them into position again. They are placed at intervals of two or three feet, so as to form a diagonal fence across the river. The fish, passing blindly along in the muddy water, are frightened by the vibration of the bamboos. In their endeavors to pass the barrier they swim along it to the side of the river, where they find a large square pull net rising and falling at intervals to catch them.

In many places along the banks of the river there are large stretches of reeds (*Phragmites*). These serve a double purpose. While growing they help to protect the banks of the river from encroachment by the flow of the tidal water. When cut they are made into the well-known reed sun blinds, with which verandas and many other places are protected from the blazing heat of the summer sun.

LAKES. There are several small lakes at the bases of the hills. These are generally held in by artificial embankments. They are useful as reservoirs for the canals. The most remarkable of them is situated about ten miles southeast of Ningpo City. There an irregular line of hills was found to almost enclose a large piece of the plain. Centuries ago some man with an engineering turn of mind saw the possibilities of the place. Six or seven pieces of dike were built, in all about a mile in length. The result has been the formation of a very shallow but exquisitely beautiful lake, standing about five feet above the plain. It is almost completely surrounded by hills, which rise at the highest to Foh-ziu Saen, referred to above. It is about six miles long and abounds in bays on every side, except along the straight dikes. The Chinese do not appreciate its beauty. This splendid body of water forms a reservoir to feed the canal system over a large area.

OFF-SHORE FISHERMEN. Curiously enough this lake is the home of the off-shore fishermen. They are a fine, hardy set of men with

a rough life full of hardship. Their fishing grounds are among the outer islands of the archipelago, where they go during the winter season of northwest winds, from October to May. Their rendezvous, when setting out, is in a large harbor in one of the outer islands, where thousands of pairs of boats, each carrying from seven to ten men, are gathered. In the summer, their large boats are drawn by manual labor up into the canals across the haul-overs, and from there into the higher water of the lake. Here during the summer months the boats are hauled ashore and repaired. The large villages of Dao-kong-saen, with a population of about 18,000, and Ing-kô-waen, with about 14,000 people, and several other villages on the shores of the lake are almost entirely inhabited by fishermen and their families.

CANALS. Looking on the plains from the top of one of the hills the most remarkable feature of the landscape is the canal system. How much of this has been made by the deepening of runnels of water and how much by direct design, it is difficult to determine. As will be shown later, the fact of a canal being crooked or straight is no guide to its origin.

The canals form a network in every part of the plains. They are the main roads of the district. Every village is placed near a canal. All heavy freight is carried on them by boats, and almost every village sends its one or more passenger boats on them daily, either to Ningpo, or to one of the main centers of population. As there are no wheeled vehicles anywhere in the district, the canal boats are indispensable for general traffic.

Mention has been made of the *pô*, or haulover,* as the Chinese substitute for a lock in passing from one level of water to another. These are built of solid blocks of stone in the form of a very obtuse-angled inverted A. About ten minutes is required for a crossing. In some places, notably on the banks of the Dzao-ngo River, buffaloes are used to haul the boats over, but in most places the work is done by a winch on each side, turned by men. Pieces of mud are cut out of the river side and, after being partly dried, are placed on the blocks of stone to lubricate the passage of the boats. In times of heavy rains or of very high tides, the water washes the mud away and makes the passage over a *pô* very uncomfortable. It is needless to point out that boats drawn over such back-breaking obstacles are subject to a heavy strain, and that only flat-bottomed boats could pass over them.

* Cf. illustration in É. Reclus: *Nouv. Géogr. Univ.*, Vol. VII (L'Asie Orientale), p. 589.—ASST. ED.

Large flocks of ducks are reared on the canals. Some flocks number more than a thousand. They are usually in charge of a "duck-herd" (Fig. 2), who takes them to the duck-house at night, where they lay their eggs. In addition to taking general care of his flock and feeding them, the duck-herd watches for the ducks who lay their eggs during the day: these delinquents are killed and eaten.



FIG. 2—"Duck-herd" with ducks.

FISHING IN THE CANALS. The canals supply a great many fish and other edibles for the Chinese table. Several varieties of carp and bream, eels and marsh tortoises are the most common. A Chinese proverbial expression for fine eating is "Fresh bream and sliced pork dumplings."

Much of the fishing is done by nets. Other methods, however, are employed. The laying of baited hooks to catch some kinds is common. One of the strange sights in the canals is that of catching fish by trained cormorants. These birds sit solemnly on the edge of the boat with rings round their necks to prevent them from swallowing the fish. Suddenly the fisherman begins to shout to them and with a long bamboo brushes them all off into the water. Then a lively scene ensues. The man continues to shout and beat the water with his bamboo, while the birds dive for fish. They come up and endeavor to swallow their prey. When the man sees a bird with a fish half swallowed, he puts his bamboo under it and jerks it up into the boat. There he compels it to disgorge into a basket and then tosses it back into the water. After the birds have finished their work they are fed on the offal and smaller fish.

DREDGING THE CANALS. The natural tendency of the canals is to silt up with mud. The farmer, however, finds that this mud is most useful to help enrich the soil of his fields. The dredger he uses is a very simple one. Two pieces of bamboo tied together in the form of scissors and, at the ends of these poles, two bamboo baskets fitting closely together like a bivalve shell complete his outfit. The thin slush is gathered into boats in the winter. From the boats it is scooped up on the fields near the canals. There it dries in the sun, and in the spring the men cut it up and spread it over the fields.

Another use for this mud is to make bricks and tiles. It is first dried, then moistened to a proper consistency, molded into bricks or tiles, partly dried in the sun and then baked. The gray bricks thus made are very hard and resist the action of the weather for a long time.

A further use is made of this mud as a substitute for mortar in the building of sheds and the poorer class of houses. A good substitute for cement is made of mud, sand and lime. This cement dries slowly, but when it is set, it becomes very hard. The sand comes from the village of Nying-kōng-gyiao (mentioned below) in this district and the lime from other hills.

IRRIGATION. The Chinese are noted everywhere as past masters of the science of irrigation. Nowhere can this be better seen than in northeastern Chehkiang. The use of the canals as reservoirs for irrigating the fields is even greater than for the purpose of transport. In very dry summer weather the water is pumped out on the fields till the canals are emptied. Traffic must then fare as best it can.

As the staple crop on the plains is rice, a constant supply of water is essential. The water is pumped on to the fields by chain pumps made entirely of wood. In some places men use a treadmill to drive the pumps, but more commonly the work is done by the patient ox. This and ploughing are the two principal employments for oxen in the district. For the best rice crops the fields should be kept under two or three inches of water all through the season. To keep this level water must be pumped daily except when there is rain.

STREAMS IN THE HILLS. The supply of water in the canals in most cases comes partly from mountain streams. Some of these flow with rapids and cascades in ravines; others on pebbly beds in flood plains. Much of the water in these streams is deflected from the main course for irrigation purposes. These subsidiary channels are found near the courses of all these streams, channels that can be drawn from at will.

In some of the larger mountain streams the water is used to turn simple pulp pounding mills, where bamboo is prepared and made into coarse wrapping paper.

One of the largest of these streams enters the canal system at Nying-kông-gyiao [Yin-kiang-kiao], a large market town about 20 [8 or 14?] miles south [S. W.] of Ningpo.* From here to the village of Da-kyiao, a distance of about 10 miles up the stream, boats of very light draft and bamboo rafts are used. The pebbles in the bed of the stream are arranged to form dams at intervals, and the rapids are gathered into narrow channels, thus giving enough depth of water for the boats and bamboo rafts.

THE HILLS. The ridges of many of the hills have very poor soil, composed of half decayed rocks. Outcropping ledges are rare. On some there is a fair growth of grass, but on many of them nothing will grow but stunted pines. On other hills very coarse grass and brushwood may be found. All these are used for firewood. People of western lands will probably be astonished to hear that the Chinese name for the azalea is "firewood flower." Hill sides that are perfect flower gardens of white roses and white, pink and yellow azaleas in the spring, are ruthlessly stripped to supply kitchen fires in the winter.

In the hollows of the hills the soil is better. Here the farmers make terraces for rice fields, and the water of the hill side springs is carefully guided in channels from field to field for irrigation.

In the damp ground at the bases of the hills the soil is used for groves of bamboo. The uses of bamboo will be noticed later.

QUARRIES AND STONE WORK. At Nying-kông-gyiao, at Da-ying, on the western branch of the Ningpo River, and on some of the islands off the coast, there are large stone quarries. The stone is unusually hard and tenacious. The common form of bridge over nearly all canals has a span composed of long slabs of stone. (Fig. 3.) The slabs are nine or ten feet long and only four or five inches thick. They are upheld only at the ends. Only the hardest of stone would bear all its own weight and the weight of heavy loads passing over it.

The foundations of all walls are composed of this stone. The damp, muddy soil within three or four feet of high water level, would soon rot bricks or wood. Chinese houses in northeastern Chehkiang are built so that the heavy tile roofs depend upon the

* On the Karte von Ost-China, 1:1,000,000, it lies about 6 miles farther west than indicated on the author's map.—ASST. ED.

support of wooden posts, the walls being built after the frame and roof have been finished. White ants abound in many places. To prevent their ravages, in all important buildings each post stands on a round stone foundation raised from the floor. In some of the rest-sheds on the sides of the roads each post is composed of one long single stone.

In country places at irregular intervals and in the villages closer together, there are stone landing-steps leading down to the canals



FIG. 3—Bridge showing span composed of long slabs of stone. Si-hu, or West Lake, west of Hangchow, in the background.

where the women wash their clothes, rice and other things. Stone flood gates for use in time of heavy rains are to be found in all the canals.

The city walls of all large cities are built of huge blocks of stone, ten or fifteen feet thick. These are so substantially built that even modern artillery can do very little to destroy them. This was shown in the China-Japan War and in the Boxer Troubles.

All main "dry roads" of any importance are built of stone. In most cases these roads are only four to eight feet wide and are simply composed of slabs of rough stone one to three feet wide in a single row, bordered by bare earth. In addition to the durable nature of the material, a great advantage is gained from the general dryness of the stone slabs. They are always raised up above the

rice fields, and water runs off the stones at once. One disadvantage is that when slightly damp the stones become very slippery. In this the Chinese shoe with a yielding cotton sole is found much more secure to the step than the foreign shoe with raised heel and nails.

Stone is used for building graves. These are all above the level of the ground. In many cases one or two plain slabs of stone are laid as a foundation for the coffin, the sides are built just large enough to contain it, and the roof is made of the same material, with runnels for water, so that the coffin may be kept perfectly dry. Lastly, stone is used for mill stones and for hulling rice. In both these cases the mechanism employed is exceedingly simple, but without illustrations it is difficult to describe it.

Chalk is found in some of the hills and is made into lime, but the best lime for house building is imported from Fu-yang on the Hangchow [Tsien-tang] River. Another use, however, is made of this chalk. It is pounded up very fine and the white powder is used by women as powder for their faces. In a little coarser form it is mixed in with rice to make it white and attractive. For this reason all rice needs to be washed before it is cooked.

SOIL OF THE PLAINS. The muddy soil of the plains is exceedingly rich. Its depth has never been fathomed. At the city of Shanghai, which is situated on a neighboring plain where the conditions are similar to those of northeastern Chehkiang, borings have been made 500 feet deep, but no rock has been found. If the surface soil is taken off for any purpose, as, for instance, in piling a mound on the top of a grave, a little manure will soon make the stripped surface fruitful. All of the fecal matter of the centers of population is used to fertilize the soil. This is one cause of the unenviable reputation China has for foul smells.

Owing to the general irrigation of the fields and to the narrowness of the roads, there is usually no dust to be raised by the winds. But about once a year there is a "dust storm;" the lower air is usually quiet, but the sky is hazy, and everything becomes covered with dust, the source of which is probably the dry plains of Mongolia.

Reference has been made to the use of mud dredged from the canals in making tiles and bricks. In the village of K'ông-k'eo, at the foot of the Vong-hwô hills, there is a large pottery of earth dug near the hill side. At this place huge earthen jars are made capable of containing about a hogshead. These jars are used for collecting rain water, and they may be found in every household. Smaller jars of similar shape are made for various household and other

uses. Wine jars and rough earthen bowls are also made there of the same material.

WATER AND ICE. With the exception of coolies, who sometimes drink water from the canals in their hands, no Chinese drinks anything but hot tea. A doctor once remarked: "The only salvation of the Chinese is that everything they eat and drink is boiled."

In some places, especially along the side of the Ningpo River below the city, there are large ice sheds. The canals seldom freeze, but during the winter the rice fields are flooded, and the ice, a quarter or half an inch thick, is gathered after each sharp frost. This ice is used for keeping fish fresh, especially in hot weather, and for other purposes. It is unnecessary to add that it is quite unsafe to put it into anything which is to be cooled for immediate consumption, as it is loaded with germs of disease.

ANIMALS. The fauna of northeastern Chehkiang is abundant, but in some cases the animals are not put to use as they might be. Oxen are used for the purpose of ploughing, also for turning the chain pumps for irrigation and on some of the haul-overs. A striking feature in many fields is that of ploughing with the patient water buffalo. (Fig. 4.) These huge but mild animals are also used for turning the irrigation pumps, for turning rice hulling and grinding mills and for various other purposes where great strength is needed.

Ponies and donkeys are also to be found in this district, but they are used for carrying persons only. There are no wheeled vehicles, and loads are either carried by boats, or on the shoulders of porters. Dogs and cats are abundant, so also are rats. No attention is paid to the breeding of dogs, and all pups that are born are allowed to live. The result is that the only variety is a medium sized creature with a sharp nose, and as a rule, quite destitute of courage or intelligence. The dogs of a Chinese city are scavengers of the vilest type.

Goats are bred in small numbers and are used as food. The ordinary goat-mutton is a combination of bones and leather. The skin is not stripped from the flesh, but the hair is shaved off. The amount of meat between the bones and skin is exceedingly small, and the taste is poor. Hogs are bred in large numbers, but no care is taken in the selection of the best varieties. The flesh is so generally eaten by the people that the word translated "meat," when used with no qualification, means pork. The skins are cured in such a way as to remain white. Thin boxes are made of camphor

wood, and pigskin is stretched over them. This is the box commonly used for storing clothes. It might be added that pigs are the rivals of dogs as the filthy scavengers of Chinese cities. If the buyers of pork, now sent from China to the London markets, could see the foul creatures whose flesh they are eating, possibly they would choose some other kind of food.

A small variety of deer, resembling a fallow deer, with a white belly and large white spots, is found in the hill districts. The flesh of this is used for food and the skin for various purposes.

In the winter the lakes and larger waterways abound with wild ducks and geese, and on the hill sides there are large numbers of pheasants and wild pigeons. Many of the pheasants and pigeons



FIG. 4.—Ploughing with water buffalo.

are shot and brought to market, but the proverbial shyness of the water birds makes it exceedingly difficult for the Chinese with their primitive firearms to kill them.

Reference has been made to the flocks of tame ducks on the canals and the use made of them. Fowls, too, are bred in large numbers. The true home of the celebrated "Shanghai Fowls" is Lang-shan, on the Yang-tze River, but a similar and equally fine breed is cultivated in the island of Chusan, the largest member of the archipelago off northeastern Chehkiang. Fowls' eggs in the ordinary form are eaten on certain periodical feast days, and the fowls themselves are generally eaten at the New Year season. Fowls' eggs are preserved in a specially prepared mud made of gravel, lime and salt. They are kept in this till the whites take on a

greenish hue. They are then boiled hard and are considered a great delicacy at feasts.

In the swampy fields frogs abound. They are called by the natives "field fowls." The legs of these are eaten as delicacies, but the mandarins do not allow the frogs to be caught till after the rice has passed the bloom, as they are supposed to eat destructive insects.

CROPS. With a semi-tropical climate and rich soil the ground produces abundantly all the year round. On quite a large proportion of the fields two crops a year are regularly raised. Wheat is harvested in June. Early in the year late rice is sown very thickly in small patches, and it comes up like grass in a meadow. As soon as the wheat is harvested, the ground is at once flooded, ploughed and manured, and then the rice, by this time five or six inches high, is planted out by hand in clumps of three or four stalks in even rows. As the stalks are drawn out of the mud, the whole root comes with it, and, when planted again in mud, it revives at once. This crop of late rice is harvested in November. Early rice is alternated with cabbages and late winter vegetables.

The soil and climate are both suited for growing cotton. The plain of Saen-poh is celebrated for this. Cotton wool is used for padding clothes in the cold weather. As it is non-absorbent, these garments are useful in wet weather as waterproofs. It is also used for padding large bed quilts. These are used in the place of mattresses, blankets, sheets and all other bedding. Until the last few years the underclothes of all classes and the outer clothes also of the lower classes were made of cotton. Spinning and weaving have been carried on by the simplest machinery, but native cloth is fast being superseded by that from foreign cotton mills. The shoes with cotton cloth bottoms, referred to above as preventing one's slipping on wet stone roads, absorb moisture and are wet through almost instantly in wet weather. It is worth while mentioning that the native pattern of socks is made with two layers of thin material, and for this reason they are proof against mosquito bites.

Corn, peanuts, sweet potatoes, beans and other crops are grown, also a very poor kind of turnips. Beans are made into bean curd, a favorite dish with the poorer people. Chinese soy, the principal ingredient in various sauces and "relishes," is extracted from beans. Vermicelli, too, is made from bean flour. A cooking oil is extracted from peanuts. Some of the cabbages are partly salted down and left to ferment. This also is a common "flavoring material" for the rice of the lower classes.

In the spring the plains are bright with yellow patches of *yiut's'ae*, a kind of rape. The oil made from this is used for all kinds of cooking purposes and for dressing the hair.

Another crop for which the swampy fields are well suited is that of rushes. These are regularly cultivated. They are then in exceedingly primitive looms made into mats. These mats are used to wrap round bedding and in the hot summer weather are very cool to sleep on. Some of the better qualities are dyed and made into the Chinese matting which is so well known in western lands.

In some of the fields a variety of water chestnut (*Eleocharis tuberosus*) is grown. The fruit is rather wooden and tasteless, but large numbers are sold in the streets. Chinese taste differs from that of foreigners from the West.

Indigo is grown in the district and is used for the dyeing of clothes. Blue is by far the commonest color for Chinese clothes.

TEA. On every hill side, where the soil is suitable, tea is cultivated. These precious leaves are grown on small stunted bushes. The Chinese for their own taste simply dry the leaves and, when they make the tea, use boiling, or nearly boiling, water. In preparing what is known as "red tea," the tea which foreigners use, the leaves when half dry are bruised sometimes between the toes of men. Details had better be left untold, lest the taste of China tea should be spoiled to the reader.

TREES. Although China is said to be denuded of her forests, trees form one of the leading features of every landscape in north-eastern Chehkiang. On the hill sides some of these are self-sown, but on the plains and in specially selected spots on the lower hills some care is shown in planting suitable trees. A common variety of soft pine is grown for ordinary timber. Another variety of strongly resinous pine is found to be almost impervious to the ravages of white ants and for this reason is used in better houses.

Magnificent camphor trees in very many places beautify the landscape, especially when the bright young leaves appear in the spring. The native workmen make boxes and furniture of this wood. Clothes packed in camphor wood boxes and drawers are protected from the moth.

A variety of white maple is also grown. This wood has very little grain and is suitable for carving. Ningpo carvers are noted in every part of the world for their beautiful work in this wood. They make photograph frames, boxes, large and small figures, besides large furniture, and ship them everywhere.

The *Chamaerops*, a variety of gomuti palm, flourishes in some parts, especially in the narrow valleys and at the base of the hills. The fiber round the trunk of this tree is non-absorbent of water. The country people use it for making rain-coats. Boatmen and others use it for making ropes, which do not rot with constant immersion so quickly as hempen rope would. The fiber is also used for making mats for the outside covers of Chinese traveling bedding: it is here found to be doubly useful, for, in addition to keeping the bedding dry outdoors, it serves indoors, when spread under the other bedding, as a protection against bed bugs, for these insects will not crawl on it. In a country where the people do not often wash themselves or their clothing, or clean their furniture, such an insulation is an invaluable aid in procuring a night's rest. A thinner cord made from the palm fiber is used, stretched on a frame, to make a slightly yielding bed spring.

In some districts there are large tracts of mulberry trees, grown exclusively for food for silk worms. The quality of the silk produced is not so rich as that made in the Hangchow and Soochow districts, but the industry provides employment for a large number of people.

The inferior growths of all trees are used for firewood. Large quantities of charcoal are made in the hills. As there is no coal within a long distance, the gathering of firewood and the manufacture of charcoal are most important industries.

Although they are not indigenous to northeastern Chehkiang, mention might be made here of two other varieties of trees. One is a very beautiful tree known as the "Maiden Hair Fern Tree," with leaves similar in shape to those of the maiden hair fern. It has been advertised in England by a well-known firm as "no longer indigenous in any part of the world." It grows a little distance west of the district under consideration, in the upper reaches of the Dzien-dang, or Hangchow River, and is one of the commonest trees to be found there.

The other tree grows in the district surrounding the city of Hwei-chow, in the neighboring province of An-hwei. It is that from which the celebrated "Ningpo varnish" is made. The secret of preparation of this varnish is held in a certain clan. As a covering for wood it is unrivaled. The surface is bright and dries extremely hard in damp weather. When it is dry, boiling water does not injure its surface. It thus makes a much better surface for tables than French polish. The Ningpo workmen have made it

famous, as the commonly accepted name shows, although the principal ingredients are produced elsewhere.

With regard to flowering trees mention might be made of a species grown in the district, which is called the *lah-me hwô*. It bears a bright yellow flower in winter, when there are no leaves on the tree. Another tree is called the *kwe hwô*. It is an evergreen and produces flowers in the autumn. These flowers are very fragrant and are much prized by the natives.

The fruit trees are varied, as might be expected in a district which lies between the heat of the tropics and the cooler latitudes of the north. In the neighborhood of the small city of Koh-gyii, which lies under the shelter of the Ningpo promontory, small oranges are grown. In the same place and in many of the narrow valleys between the eastern mountains, the natives grow large numbers of very small oranges, about the size of marbles. These oranges are commonly eaten in their skins. They are used, too, to make delicious preserves.

Pears, plums, apricots, and apricots with flattened ends are also grown in the district. To a visitor from western lands these fruits do not seem to have the same flavor as those common at home, but the natives eat them in large numbers.

A fruit that is much prized by the Chinese is called the *laen-dzô*. This is a sour red fruit about the size of a cherry, a variety of hawthorn (*Crataegus cancata*). It makes a delicious preserve, but the most popular way of preparing it is in the form of a red jelly. This is one of the commonest forms of sweetmeat put upon the table for a casual visitor's refreshment.

Another popular fruit in its season is the Chinese medlar (*Eriobotrya japonica*), called the *bibo*, or in Canton, the *loquat*.

Perhaps the most delicious edible fruit in the district is the *yang-me*, or tree shrubbery. This is the *Myrica*, a fruit similar to the arbutus. It is very much prized by the natives, and during the season is eaten by all classes of the people.

Another useful, but not edible, fruit is that of the *gyiu-jii*, or tallow tree (*Excoccaria* [*Stillingia*] *schifera*). Candles are made from the covering of the seed of this tree, and oil, extracted from the seeds by pressure, is used in lamps and for cooking.

BAMBOO. Turning from other vegetables and trees to the gigantic grass called "bamboo," we find that it affords the most striking series of adaptations in this district, or in any part of China. The character of the Mongolian Race has been compared to their great

plant, the bamboo; yielding to pressure from without, but returning to its original position as soon as pressure is removed.

Bamboo groves are cultivated with great care. A certain proportion of the growth is removed each year, either in the form of shoots, or as full grown bamboos. These are not removed at random, but in such a way as to encourage the fullest growth on a given piece of ground. Bamboo is difficult to transplant, but when it has once taken root, it will spread in all directions.

In addition to furnishing the plain "stick" of bamboo, it is prepared for use in various ways. One way is to push a long rod through the hollow core and break out all the diaphragms of the nodes, thus making it into a single continuous cylinder. Another is



FIG. 5—Chinese junk showing sticks of bamboo used to flatten the sail.

to split it diametrically into sections and, after knocking away the broken parts of the diaphragms, to split the sections parallel to the circumference into strips, called by the Chinese *mih*. The strips vary in width from about three-quarters of an inch downwards, the thickness being about one-eighth of an inch. The outer or surface strips and those next adjoining are very strong and pliable and can be manipulated in numberless ways.

Fishermen and boatmen use the bamboo in every part of their work. In nearly all but the largest boats a heavy bamboo of the *mao-coh* variety is used as a mast. On the sails at intervals of every foot or two sticks of bamboo are fastened to flatten the sail. (Fig. 5.) For this reason the Chinese junk can sail closer to the

wind than any other boat known. The deep-sea fisherman uses pieces of bamboo as floats for his net. A common form of net used on the banks of the canals is square, kept in shape by four pieces of bamboo. Another piece of bamboo is fastened to the middle of this and forms the arm which is raised and lowered by a piece of rope.

In addition to the fish fence used in the tidal river (described above), another form of fish fence is used in the canals. This is made of split bamboo placed so closely that a fish could not pass through. At each fence one or two wide passages gradually grow narrower and wind into an inner enclosed space. This acts as a trap.

On passenger boats the boat hook is made of a long piece of bamboo with a hook at the larger end. The roof or cover of the



FIG. 6—House made of bamboo matting.

boat is made of bamboo used in three ways. A strong frame is made of heavy bamboo split into about four sections. Two mats are formed of interlaced *mih*, or strips of bamboo, and between these there is a thatch of large leaves taken from a dwarf variety of bamboo. This cover is strong and flexible and can be put up or taken down very easily. (For bamboo similarly used in house-building see Fig. 6.)

The strong rope, which is used to pull the boats over the *pô*, is generally made of the inferior inner strips of *mih*.

The bamboo rafts used on the mountain streams are made of large bamboos laid side by side in one layer. The smaller ends are

scorched over fire and turned up to form the bow of the raft, so that it may glide over stones in the path.

Almost without exception every tradesman adapts bamboo to some purpose or other. The cooper uses twisted split bamboo to bind his tubs and buckets. The carpenter uses large bamboo for roof beams in some small houses. He also uses pins of bamboo in joining together boards to make a smooth surface, and in many places where a Western carpenter would use an iron nail, he uses a bamboo "nail." The farmer uses a bamboo dredger for getting mud out of the canals for his fields. He uses a stick of bamboo for the handle of his digging hoe and rake, and for a light rake used for gathering straw together he has a bamboo stick split at the ends to form the teeth of the rake. Rice is threshed out in the field by hand, and a mat of *mih* protects the flying grain from scattering into the field. To winnow the chaff from the grain it is passed through a bamboo sieve in a place where the wind is blowing. A large mat of *mih* is used for drying the grains of rice, and a similar mat is used for protection from sun and rain in all sorts of places. This kind of mat, covered with tar, is used, too, under the tiles of roofs. If the farmer needs to make a fence anywhere, he makes it of interlaced pieces of split bamboo. The Ningpo version of the New Testament in St. Luke 14:23. reads "You go out on the big roads and by the sides of the bamboo fences and compel them to come in." Every burden bearer or porter uses a piece of bamboo split in half on his shoulder, with the two halves of his load suspended at the ends. The man carrying mud, tiles, bricks and similar things has rough baskets of bamboo strips suspended at the ends of his load carrier. A larger kind of basket made of finer strips of bamboo is used for carrying rice, corn and other cereals. A coarser round basket of longer shape is used for packing charcoal for market. Another of finer strips is used for washing rice for the table in the dirty canals, in fact, baskets of every conceivable shape for every conceivable purpose are made from the useful bamboo. The chair bearer has poles made of large bamboo, and the chair itself, with the exception of the floor and seat, is made exclusively of bamboo. The tailor and the silk and cloth merchants use a foot rule made of bamboo. The shopkeeper wraps up his parcels in bamboo paper and puts what small silver money he gets into a bamboo money box. This money box is a long tube with a sealed bottom. It fits into a groove at the bottom and at the top is held in its place by a lock. In this way it can only be turned upside down by unlocking it, and the size of the cylinder is such that a person's

hands could not be inserted for pilfering. Instead of gutter piping for the eaves of a house a large bamboo, split in halves with the diaphragms of the nodes struck out, makes a good substitute.

For domestic purposes the use of the bamboo is universal. The shoots, as soon as they appear above the ground, are dug out and eaten as a delicate vegetable. The chopsticks, with which the food is eaten, are generally made of bamboo. Kitchen cupboards, used for storing crockery and eatables, chairs, flower vases and hair combs are made of the same material. If a householder finds that the threshold of his door is wearing down, he nails on a strip of heavy bamboo to protect it. The housewife washes her clothes at the side of the canal and then dries them on a long piece of bamboo in place of a clothes line, supporting this substitute for a clothes line on a three-legged bamboo frame. She rocks her baby in a bamboo cradle. She sweeps up the dust with a broom made of bamboo twigs and sweeps it into a dustpan made of bamboo strips. Brushes, the bristles of which are made by splitting the continuation of the bamboo handle, are used for washing cooking pots and scrubbing rough surfaces. Inside the cooking pots a frame of split bamboo is placed, so that a bowl of anything may be heated or steamed by the water or rice underneath. Bamboo scrub is used for firewood. The remarks made about the numerous shapes of baskets used by tradesmen also apply to those used in the household. Bamboo frames are fastened on the beds to support mosquito nets and bamboo shavings are used for stuffing pillows, cushions and sometimes mattresses. The scholar writes with a pen the handle of which is made of bamboo; when he has used the pen he puts it upside down in a bamboo vase; he smokes a pipe made of a tube of bamboo with a small brass bowl, and, if the weather is hot, he uses a fan with a bamboo frame. If he leaves home, he sometimes uses a bamboo box for his clothes. The umbrella he carries in wet weather has a handle made of bamboo, with ribs of split bamboo, and it is covered with oiled bamboo paper. If the housewife goes out in wet weather, she puts on a pair of overshoes made of the husk which encloses the bamboo shoot as it comes out of the ground.

The above list of uses is not exhaustive, but enough has been written to show that the use of bamboo enters into every department of Chinese life. The bamboo is an invaluable possession, and the Chinese thoroughly appreciate it.

FAILURES OF ADAPTATION. A chapter on adaptation would not

be complete without giving some instances of failures to adapt, or wastes. In view of the care and economy generally shown by the Chinese, some of these failures and wastes are very striking to a Western observer.

On a large proportion of the hill sides the growth of wood is kept down to scrub. The wood cutter only thinks of his present small benefit, not of the value of the timber that might grow for his son.

On some of the hill sides there is an abundant growth of grass. Much of this is coarse, but where it is eaten, it is proved to be nutritive and good. With the exception of a very few goats, no stock is kept to pasture on this grass.

The stagnant water kept exposed in earthen jars forms a fine breeding ground for culex mosquitoes, and the rice fields and swamps are equally well suited for the malaria carrying anopheles mosquito.

SUPERSTITIONS. Many failures to adapt are caused by superstition. When a dog, or cow, or any other animal dies, the corpse would offend the god of the earth if it were buried, so it is thrown into the river or canal to rot away. Last summer rinderpest was raging among the cattle. On the river side at Ningpo the stench arising from these rotting corpses, as they drifted down on the tide, was sometimes too horrible for words. Rice, vegetables and clothes are washed in the canals, sometimes not far from decaying bodies. It is needless to point out how easily diseases of all kinds may be spread abroad. In the autumn cholera travels along these waterways.

A common form of superstition is called *fong-shii*, that is, the "influence of the winds and waters." This superstition shows itself in various ways, the commonest of which are three in number. First, a peculiar configuration of hills near a certain place may bring ill luck. For instance, an imaginary resemblance to a tiger's head and a lion's head on neighboring hills would be bad for places near to each other. The lion and the tiger might quarrel. A second way is to avoid all high buildings except pagodas and temples, which are built to control the *fong-shii*. The third way is to avoid all straight roads and paths. The common reason for this is that evil spirits can only travel in straight, or nearly straight, lines.

This superstition causes many an economic waste, and makes many an adaptation less effective than it would be otherwise. As an illustration of the first, all graves are made above ground, and must be in a place where the spirit of the departed will be comfortable.

The place is chosen by a Professor of *Fong-shii*, who earns his living by encouraging this superstition. The grave may be placed in the middle of a rich field. The platform of the coffin must be raised, and soil must be used for this purpose. Afterwards a huge mound is raised over the coffin, thus often using up the valuable soil of quite a large piece of land. Centuries of graves near large centers of population consume a large proportion of the productive soil.

The advent of western machinery is causing considerable disturbance to the second aspect of *fong-shii*. The unhallowed chimney shaft of a big factory breaks all rules. A few years ago a mint was built in the city of Hangchow, near the official quarter. Soon after it was finished, an old opium-smoking mandarin died from natural causes, or rather, unnatural causes, connected with his vicious habit. The cry was made that the *fong-shii* had been disturbed. The mint was taken down and the tall chimney was moved to another part of the city.

The effect of the third form of this superstition is shown in many ways. The doors of houses in a street are never placed opposite to each other. In some cases where the entrance of a house faces the open fields, a wall is built opposite to it. If a road runs straight alongside a main canal every time a bridge over a branch canal is crossed the bridge is built out into the main canal. To a person walking in the dark this is dangerous. Instead of being made straight, the canals are all more or less crooked. In cases where they are straight for any distance the bridges are sometimes built so low that boatmen are obliged to take down the covers of their boats before they can pass under. In other cases one or two embankments are built out into the canal from alternate sides to destroy the straightness, or a small loop is made with a shrine or a rest house built on the projecting piece of ground. A short canal used to lead directly from the Inner River to a market town called Meng-ky'i, about 15 [9?] miles northwest [N.] of Ningpo. For a time the town was not very prosperous. The inhabitants, therefore, dammed up the direct canal, and now the boatman is obliged to turn off into a branch canal to another town and turn back to regain the main canal, thus adding about two miles to a road, which was originally about half a mile. To a white man this would seem a strange way to help the prosperity of a place. The village of S-kuu-saen, on the side of the Ningpo Lake, has lately shown signs of decay, and the leading members of several families have died. It was decided that the cause of this was the open space of the lake opposite to the village. Although the authorities are very jealous

of any encroachments on the lake, no opposition has been made to the building of a dam opposite the village, for the purpose of regulating the *fong-shih*.

The above will show that most of the failures to adapt on the part of the Chinese in northeastern Chehkiang are caused by ignorance and superstition. The advent of modern education and of machinery, and, still more, the preaching of a religion which is in antagonism to all occult vagaries and superstition, will probably break down these failures and hindrances, so that a visitor fifty years hence may have a story to tell of almost complete adaptation.

HANGING VALLEYS OF THE YOSEMITE

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TABLE OF CONTENTS:

Introduction.	Longitudinal profile of the Merced River.
Former elevation of the Merced River.	Valley widening in jointed rocks.
Cause of over-deepening.	Notches beside the falls.
Comparison of the Yosemite with other	Conclusion.
Valleys.	References.

INTRODUCTION

So much has been written concerning the Yosemite Valley, that another contribution to the subject needs but a short preface. An elaborate description of the region would be out of place, since the salient features of the valley and its hanging tributaries are already familiar to geologists and geographers. Turner ("The Pleistocene Geology of the South-central Sierra Nevada, with especial reference to the origin of Yosemite Valley, 1900") has reviewed the literature relating to this region published prior to 1900, with especial reference to the theories of the origin of the Valley; and has described many of the topographic features in detail. He concludes that the Yosemite Valley was produced by normal stream erosion in extensively jointed rocks. Branner ("A Topographic Feature of

the Hanging Valleys of the Yosemite, 1903") has described the peculiar notches which frequently occur in the lips of the hanging valleys and has found in them confirmation of the theory that water and not ice was mainly effective in carving the main valley. In a short criticism of the paper by Turner, Gannett ("The Origin of the Yosemite Valley, 1901") expressed the opinion that "Yosemite is quite an ordinary and necessary product of glacial erosion." Among other papers published since Turner's review, mention may be made of "Glacial Erosion and the Origin of the Yosemite Valley," by W. P. Blake (1900), a general discussion of the subject in which the author maintains the glacial origin of the Valley. In a paper on the "Profile of Maturity in Alpine Glacial Erosion," D. W. Johnson (1904) regards abnormally deep portions of Sierran valleys as the result of glacial deepening. E. C. Andrews in discussing "Corrasion by Gravity Streams with Applications of the Ice Flood Hypothesis" (1909) treats the Yosemite as an ice-eroded channel.

The following pages discuss the former altitude of the Merced River in the Yosemite region, as indicated by the gradient of the tributary streams; the cause of the later over-deepening of the Merced, by which the hanging valleys have been produced; the process of valley widening in jointed rocks, considered in relation to the present width of the Yosemite Valley, and to the retreat of the lips of the hanging valleys; the notches in the lips of the hanging valleys, and their relation to the problem of glacial erosion.

THE FORMER ELEVATION OF THE MERCED RIVER

In an earlier number of the *Bulletin* (November, 1909) the writer set forth in some detail his reasons for believing that the gradient of tributary hanging valleys furnishes the best means of determining with reasonable accuracy the amount of over-deepening which a main valley has suffered. Without entering again into a detailed discussion of the limitations of the method, it may be noted that measurements of gradient used in determining over-deepening manifestly should not be based in whole or in part upon the steep upper courses of tributaries, the over-steepened lower courses, very young streams having highly irregular longitudinal profiles, or very short streams. If measurements are restricted to the main portions of tributaries several miles in length which have more or less nearly attained to their profiles of equilibrium, the over-deepening of the main stream may be ascertained within fairly narrow limits, the danger of error being largely in the direction of an under-estimate

rather than an over-estimate. If a tributary has itself been over-deepened, the danger of under-estimating the over-deepening of the main valley is increased.

The excellent topographic map of the Yosemite Valley (hereafter called the "Valley Map") recently prepared by F. E. Matthes, affords a very satisfactory basis for calculating gradients of such portions of streams as are shown thereon. Unfortunately, only the lower courses of the longer tributaries are here shown; but we may estimate the over-deepening of the Yosemite Valley on the basis of this map (Scale: 1:24,000), which represents elevations by means of 50-foot contours, and compare the results with similar estimates based on the "Yosemite Quadrangle" (Scale: 1:125,000), where more of the streams are shown, but the contour interval is 100 feet. In

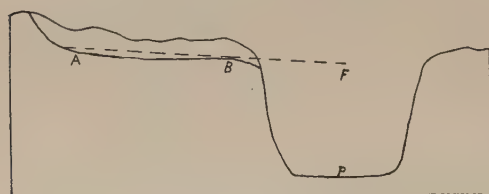


FIG. 1.

every case mentioned below the over-deepening has been determined by plotting the gradient of the portion of the stream mentioned (AB, Fig. 1) to natural scale, projecting that gradient out over the main valley to where it would have joined the former Merced (F), and determining its elevation above the present Merced (P).

The Yosemite Creek flows southward through a hanging valley on the uplands of the Sierra to the Yosemite Falls, at which point it drops abruptly into the over-deepened main valley. Above the falls only about $2\frac{1}{2}$ miles of the creek are shown on the Valley Map; for the first mile above the falls (up to the 6,750 foot contour) the gradient is a little steeper than for the next mile and a half. If we consider the more gentle gradient found along the creek above the 6,750 foot contour, we find that an elevation of about 6,575 feet is indicated as the former position of the Merced River. Considering the portion of the creek below the 6,750 foot contour, we get as the former elevation of the Merced, 6,400 feet. Basing our calculations on the average fall of the creek above the falls so far as shown on this map, we get 6,425 feet as the former elevation of the Merced. Turning to the Yosemite Quadrangle, we may compute the gradient of the creek for the last seven or eight miles of its course above the falls; and on the basis of this map we determine the former elevation of the Merced as 6,475 feet. As the floor of the Yosemite Valley opposite the Yosemite Falls has an elevation of about 4,000 feet,

the amount of over-deepening which has occurred in the main valley is, according to the four computations given above, from 2,400 to 2,575 feet, + the depth of alluvium on the valley floor, + any over-deepening of the hanging valley effected by the glacier which moved through it (Turner, *op. cit.*, p. 306). 'There is no reason to believe that the valley of Yosemite Creek was materially modified by glacial erosion; but the depth of alluvium on the main valley floor may be such as materially to augment the estimated amount of over-deepening.

The Valley Map shows practically the entire course of Indian Creek and of the East Fork of the same creek. Both of these are short streams, but in the portions of their courses above Indian Canyon both appear to have been graded with reference to a higher level of the Merced River. The gradient of Indian Creek for more than a mile above the head of Indian Canyon indicates as the former elevation of the Merced, 6,275 feet. A computation based on a similar portion of East Fork gives 6,400 feet as the indicated former level of the Merced.

Snow Creek is a longer stream, and is only partly shown on the Valley Map. The gradient of so much of the stream (above its over-steepened lower course) as appears on the map indicates 6,300 feet as the former elevation of the branch of the Merced into which it emptied. The average gradient for five miles along the course of Snow Creek, as shown on the Yosemite Quadrangle, indicates the somewhat higher elevation of 6,400 feet as the former position of the branch.

The Valley Map represents the lower portion only of Bridal Veil Creek, and shows it to be remarkably steep. A glance at the larger relations as portrayed on the Yosemite Quadrangle reveals the fact that the lower course of Bridal Veil Creek has been over-steepened, and that the Bridal Veil Falls do not represent the whole amount of discordance in the junction of tributary and main stream. Basing measurements on five or six miles of the streams' course above the ungraded lower portion, we find 6,500 feet indicated as the approximate former elevation of the Merced River.

Illilouette Creek presents a strong contrast with the other streams mentioned above. Only the lower part of the creek is shown on the Valley Map, and for the first mile above the Illilouette Falls there are indications of over-steepening of its course; but the gradient for four or five miles above the over-steepened portion, as measured on the Yosemite Quadrangle, indicates an elevation of but 5,750 feet as the former elevation of the Merced. If we make due allowance for

the over-steepened lower course of Illilouette Creek, the top of the Illilouette Falls would still be 700 feet lower than the top of the Yosemite Falls, or almost exactly the same elevation as the top of the Nevada Falls where the Merced River itself drops into the Yosemite Valley, from the higher level of the Little Yosemite Valley. The Yosemite and Mt. Lyell Quadrangles afford unmistakable evidence that numerous active glaciers once existed throughout the headwater areas of Illilouette Creek. The glacial gathering ground of the Illilouette drainage basin is larger and according to the contour maps shows more evidence of modification by glacial action than that of the Yosemite Creek basin. If under apparently less favorable conditions a glacier could extend from the headwaters of Yosemite Creek to the main valley (Turner, *op. cit.*, p. 306), it is reasonable to suppose that a glacier may likewise have extended from the headwaters of Illilouette Creek to its junction with the Merced River. Granting for the moment that glacial erosion is a possibility, the unusually low level of the Illilouette Valley is readily explicable on the basis of over-deepening effected by the Illilouette Glacier. In this connection it may be pointed out that the form of the lower Illilouette Valley above the falls, as shown by the map and as seen in the field, suggests the probability of modification by glacial action. Furthermore, of the glacial tributaries to the Yosemite Valley the Tenaya Glacier was probably the largest, with the Merced Glacier second, as pointed out by Turner (pp. 305, 306). That author mentions the Yosemite Creek Glacier next, and says of the Illilouette Glacier, "The Illilouette Glacier probably likewise reached the valley, but I have obtained thus far no positive evidence that it did so." For reasons set forth above, I should rank the Illilouette Glacier third in probable size, and the Yosemite Creek Glacier fourth. Whether this order be correct or not, the degree of apparent modification of the valleys follows this same order; the Tenaya Canyon being most striking in form and depth, the Little Yosemite Valley of the Merced River next, Illilouette Valley third, while Yosemite Creek Valley shows very little evidence of modification.

Tenaya Canyon and the Little Yosemite Valley are not considered as hanging valleys and therefore not used in the present computations, for the obvious reasons that Tenaya Canyon does not "hang" but is more closely related in form and depth to the main Yosemite Valley; while Little Yosemite Valley, although at a higher elevation, is the valley of the main river itself. Both will be referred to again in another connection.

If we except the Illilouette Valley, there is a marked agreement

in the evidence furnished by the hanging valleys as to the former elevation of the stream with reference to which they were then graded. In plotting the average gradients and computing elevations I have tried to estimate 25-foot divisions. The method does not permit sufficient accuracy to make the figures trustworthy within such narrow limits, when based on the maps mentioned. It seems safe to say, however, that the hanging valleys furnish convincing evidence that the Yosemite Valley has been over-deepened to the extent of from 2,200 to 2,500 feet, at least. If we plot cross-profiles of the valley, and continue the curves of the walls below the alluvium of the valley floor in such a manner as to give the form of a typical glacial trough, we are led to infer a probable depth of alluvium of from 300 to possibly 1,000 feet; or a total over-deepening of 3,000 feet or more. A minimum of "over 2,000 feet" is certainly a conservative way of stating the amount of over-deepening. The cause of this profound over-deepening may be next considered.

THE CAUSE OF OVER-DEEPENING

In concluding his discussion of the origin of Yosemite Valley, Turner mentions four theories which had been advanced to account for the formation of the valley:

1. That it was scooped out by ice (Muir).
2. That it was a river-cut canyon, but that the vertical walls are due to the sapping action of ice (W. D. Johnson).
3. That it was formed by a drop fault (Whitney, Reyer, LeConte? and Russell).
4. That it was formed by river erosion facilitated by strong jointing (Becker, Branner, Turner).

To the objections urged by Turner (p. 317) against the third of the above theories (faulting) may be added the following: the hanging valleys were evidently graded with reference to the Merced River and Tenaya Creek before the deep valley of the Yosemite was formed; the relation of tributaries to main stream has not been changed by the formation of the Yosemite Valley, except as regards their hanging character; hence, if the Yosemite Valley is a graben, the down-faulted block must have happened to coincide with the irregular course of the established Merced River, and must have sent off a branch graben at its eastern end to coincide with the already established Tenaya Creek. The fault theory is so improbable that we must look to normal river erosion or glacial erosion for an explanation of the Yosemite Valley.

The character of the Merced Valley west of El Portal leaves no doubt that this portion of the valley was carved by the river which occupies it. A cross profile of this portion of the valley has the typical V-shape of a youthful stream gorge, the valley walls sloping steeply down to the water's edge in many places. So far as one could judge from car-window observations, the tributaries from Bear Creek to Moss Creek enter the Merced with essentially accordant junctions. The mountain spurs on either side of the valley interlock in such a manner as to prevent extensive views up or down the valley, and the railroad which follows along the river seems to be made up almost wholly of curves, with relatively few and short straight segments. All these are features which we should expect to find in a stream-carved valley, and all contrast strongly with the features encountered in valleys known to have been long occupied by important ice streams. We must therefore conclude that the valley west of El Portal was carved by the Merced River; and this conclusion carries with it the reasonable inference that the Merced River east of El Portal has likewise been an efficient agent in valley making. Indeed, the existence of a well-developed normal valley system in this region prior to glaciation has been so well established by the studies of different geologists that the formation of the Yosemite Valley by ice erosion alone seems most improbable.*

On the other hand, it is generally agreed that river erosion alone will not account for all the features observed in the Yosemite. Of the geologists cited by Turner as accepting the river erosion theory, all three ascribe at least some erosive work to the glacier which is known to have occupied the valley, in such terms as "the process being completed by a glacier" (Becker), "ice deepened and modified it (Yosemite Valley) locally during the glacial epoch" (Branner, in personal communication), or "rounding off the projecting shoulders and spurs" by a glacier (Turner). The problem resolves itself into an evaluation of the relative importance of water erosion and ice erosion in the carving of the Yosemite Valley. Concerning this problem there still exist wide differences of opinion; and it is therefore pertinent to consider such evidence as the hanging valleys offer as to the process by which they were left in their hanging position.

The geological history of the Sierra Nevada and the general principles of river erosion are sufficiently well understood to enable one to reconstruct with reasonable certainty the physiography of the Yosemite district before the Merced had cut its canyon. With this as a starting point, one may consider the later erosion history of the region; first, on the assumption that the hanging valleys were in the

main produced by normal over-deepening of the Merced River; and second, on the assumption that glacial erosion was largely responsible for the over-deepening of the Merced.

It has been shown by Turner and others that during the Cretaceous, Eocene and Neocene the region now occupied by the Sierra Nevada was reduced by subaërial erosion to a surface of relatively slight relief, drained by southwestward flowing rivers. Many of these rivers were displaced from their former channels by lava flows during the late Neocene, but it is believed that by the close of the Neocene or early in the Pleistocene the essential features of the present drainage pattern were established. Toward the end of the Neocene occurred the uplift of the Sierra block which greatly increased the gradient of the southwestward flowing streams, and caused them to incise the deep and narrow canyons which form one striking element in the present topography. The process of canyon cutting was well advanced before the advent of the glaciers, which ultimately occupied the summit of the range and made their way some distance down the canyons of the southwest-flowing streams.

Remnants of the ancient erosion surface which formed the back (southwest) slope of the Sierra block, and beneath which the canyons have been sharply incised, may be observed to advantage from various points on the trails about the Yosemite. Although it would appear that this part of the Sierra region was never so nearly base-leveled as some portions of southern New England or of the Piedmont Belt, still the amount of relief on the intercanyon upland areas is so moderate as compared with the total relief, that one is very strongly impressed with the reasonableness of the interpretation which regards the back slope of the Sierra as an uplifted and dissected erosion surface. Whether the back slope has resulted from actual tilting, as hereafter assumed, or from a process of distributive faulting as suggested by Becker (63-67), is not essential to the present discussion. It should be stated, however, that Becker's argument against tilting, based on the failure of some of the streams to cut below their old Pliocene channels in their headwater areas, seems of doubtful value to the writer, inasmuch as it depends on the assumption that "uniform tilting would uniformly increase the grade of the streams flowing westward." This assumption would be true in the case of streams still flowing on the surface of a tilted block immediately after a rapid uplift; but is erroneous when applied to streams which have entrenched themselves after uplift, as have the Sierran streams. In like manner, Becker's appeal to the protective action of an ice cap over the high Sierra to account for deeper

canyon cutting farther down the slope seems unnecessary, as well as incompatible with the widespread evidence of glacial erosion instead of protection, in the glaciated areas.

Consequent upon the uplifting and tilting of the partially base-leveled surface, the Merced and other large southwest flowing streams must have entrenched themselves very rapidly, while weaker tributaries deepened their valleys more gradually, especially if they flowed at right angles to the main stream and hence did not have their gradients affected by the southwest tilting. Thus the tributary valleys would come to hang above the main stream. The development of the hanging relation was presumably most pronounced along the middle courses of the Sierran rivers; for near the western foothills the amount of uplift is so slight that no great discordance in junction of main and tributary streams is possible; while near the headwater areas the contrast in volume between the main stream and a tributary decreases to such an extent that one is about as powerful as the other. Even if tilting increased the gradient of the main stream alone, in the headwater areas, there could hardly develop so great a discordance in junction as would occur farther down the valley where the main stream not only experienced the same increase in gradient, but was also a much more powerful stream than its tributaries.

There is a distinct limit to the time during which hanging valleys can remain as such. As soon as a main stream has effectively entrenched itself, and begins to establish a profile of gentle gradient, its energy decreases. The tributary streams continue to degrade their valleys until accordant junctions with the main stream are established. It is a well-substantiated law of stream action that the time required for a main stream to reduce its channel to a faint gradient and to open out its valley floor to a width not many times greater than the width of the stream, is longer than the time required for hanging tributaries to reduce their valleys to accordant junctions. Accordingly, while hanging valleys might exist along the Merced and similar rivers, especially along the middle courses of such rivers, so long as the main streams occupied narrow V-shaped gorges of fairly steep gradient, it is safe to say that the more open and flat the main valley floor became, the less would the tributary valleys hang; and that where the main valley floor had come to be several times wider than the stream, and of very low gradient, no hanging valleys would exist.

If we proceed on the assumption that the glaciers which invaded the upper portions of some of the Sierra canyons were powerful

eroding agents, we arrive at certain conclusions directly opposed to those outlined above. Below (southwest of) the glaciated areas, hanging valleys entering V-shaped canyons might exist, as before. But in the headwater areas, instead of no hanging valleys, or hanging valleys developed on a smaller scale than farther down stream, these features might constitute a much more important element in the topography than elsewhere, because of extensive glacial over-deepening of favorably located headwater valleys. And since an eroding glacier would carve for itself a channel far wider than the ordinary stream channel, and might reduce or even reverse the gradient of any valley into which it came, we should expect, after the disappearance of the ice, to find the hanging valleys associated with a wide open main valley (the channel of the former glacier) whose floor might be occupied by lakes, or by a *débris* plain over whose flat surface the main stream would wander at will.

An examination of the maps and literature of the Sierra region shows that hanging valleys are not an uncommon feature of Sierran topography, even in unglaciated districts. Apparently, the uplift and tilting of the ancient surface of erosion was sufficient to cause the main streams to entrench themselves faster than many of the tributaries. The hanging effect thus produced still persists in a number of the tributaries, especially where the tributaries are much smaller and weaker than the main stream. But the distribution and character of hanging valleys in the Sierras is very significant. In the first place, they are not best developed along the non-glaciated middle course of the Merced River, as we should expect if they are due to stream erosion alone, but are far more impressive in the heavily glaciated Yosemite Valley region, and even farther east; that is, in the headwater portion of the system. Indeed, it is difficult to find typical hanging valleys of any size below the limit of glaciation at El Portal. Even small streams, such as Ned Gulch, have there effectually reduced their valleys to accordant junctions with the still youthful Merced. Bear Creek, however, is so steep for the lower two miles of its course that it suggests an over-deepening of the Merced of possibly 800', although the process of grading the creek valley is so far advanced that no typical hanging valley exists. The North Fork of the Merced River, as shown on the Sonora Quadrangle, is likewise over-steepened for the last mile of its course; the average gradient of the main part of the North Fork valley would, if continued, intersect the Merced Valley 250' above its floor. Bull Creek, in turn, has an average gradient for eight miles along its course which would intersect the North Fork, to which the creek is

tributary, something less than 400' above the present level of the Fork. It is apparent that these hanging valleys, whose features are not typical, and whose discordance in junction is usually but a few hundred feet, are not to be compared with the hanging valleys of the Yosemite, where tributary streams cascade abruptly down the main valley walls, and have a quite uniform discordance in junctions of more than two thousand feet.

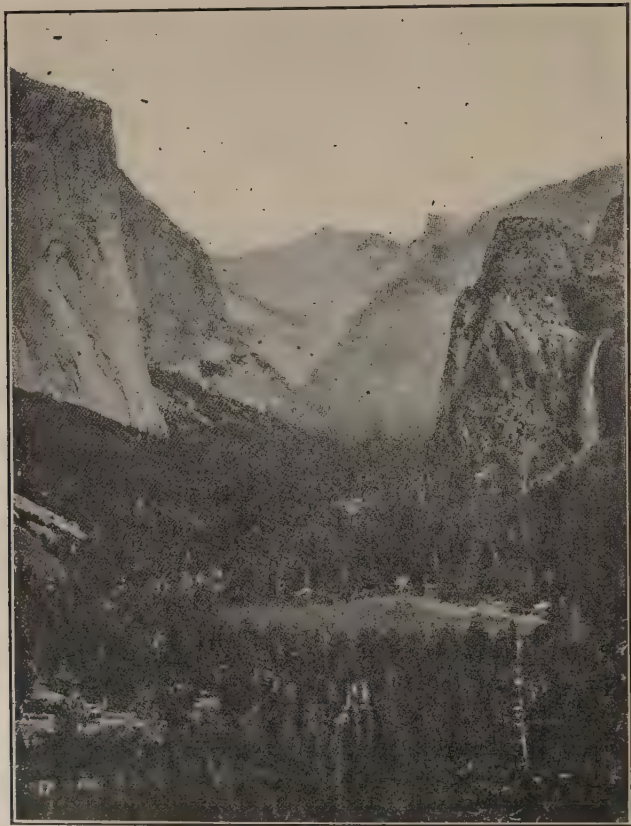


FIG. 2.—Yosemite Valley looking east.

The hanging valleys west of El Portal enter a narrow-bottomed gorge of fairly pronounced gradient. The hanging valleys of the Yosemite enter a main valley (Figure 2), whose floor is many times the width of the main stream, and whose gradient is unusually low. In this contrast we find further evidence that the hanging valleys of the two areas are of different origin.

It appears, then, that the character and distribution of the hanging valleys along the Merced are just the reverse of what we should expect, assuming stream erosion to be the only important factor in their formation; but accord perfectly with the theory which admits extensive glacial erosion in the headwater areas, and accelerated river erosion farther downstream. Extensive over-deepening of the Yosemite Valley by glacial erosion seems to me as necessary a conclusion as the formation of the V gorge of the lower Merced by river erosion. Judging from the relations of the tributaries west of El Portal, from the character of the longitudinal profile of the Merced itself (described below) and from the position of the Yosemite near the headward portion of the Merced basin, I should imagine that little if any of the observed over-deepening of the Yosemite is to be charged to the acceleration of the Merced in pre-glacial times; and that glacial erosion is responsible for the major part of the more than two thousand feet of over-deepening observed, plus the unobserved amount concealed by alluvium on the valley floor.

(To be concluded.)

EXPLORATIONS IN DUTCH NEW GUINEA

DR. LORENTZ'S ASCENT OF WILHELMINA PEAK

We were almost completely ignorant of the interior of Dutch New Guinea until the explorations that were begun in 1903 by the geologist and historian, Prof. Dr. C. E. A. Wichmann. He, however, made Humboldt Bay on the north coast the chief scene of his labors. His work was followed by the South-West New Guinea Expedition in 1904-1905, led by Captains Posthumus Meyes and De Rochemont, who discovered East Bay and the North River on the south coast. Various other parties have contributed to our information; and Dr. H. A. Lorentz led expeditions into southern Dutch New Guinea in 1907 and 1909. In January and February last Dr. Lorentz gave a lecture on his last explorations before the Royal Geographical Society in London and the Scottish Geographical Society in Edinburgh, and the paper is printed both in the *Geographical Journal* for May and in the July number of the *Scottish*

Geographical Magazine. The following summary of his work in 1909 has been prepared from this paper.

In the expedition of 1909 he reached Wilhelmina Peak, though in 1907 he attained only the southern edge of the Snow Mountains, while Wilhelmina Peak is on the north side of the range. Two hundred and eighty-six years after Jan Carstensz mentioned in his journal that on Feb. 16 he saw mountains covered with snow, the Lorentz expedition reached these untrodden snows.

The members of the expedition consisted of Dr. Lorentz (leader and zoologist), Commander J. W. van Nouhuys (geology, cartography and meteorology), Surgeon v. Römer (botany, medicine and anthropology), a native physician and about 100 Dyak carriers. He was also accompanied by a small military force under command of Lieut D. Habbema. On Aug. 5, 1909, the party sailed from the port of Soerabaja, Java, and on Sept. 1, they arrived at East Bay on the south coast of New Guinea. Three large rivers, the Oetoemboewe, North and North-West, empty into this bay. It was the starting point for the interior. The field of Dr. Lorentz's work extended from the sea to Wilhelmina Peak between $138^{\circ} 30'$ and $138^{\circ} 45'$ E. Long.

The North River offered the best route for penetrating as far as the mountains. Dr. Lorentz was only twenty-two days in reaching Alkmaar at the base of the mountains, though in 1907 he had spent seventy-nine days on the way. On Oct. 4, the expedition was assembled at Alkmaar, where provisions were stored for 100 days. Here, on Oct. 27, the tramp over the mountains to Wilhelmina Peak began.

Although Wilhelmina Peak is only about thirty-five miles from Alkmaar, the difficulties of the route were so formidable that it seemed likely at times that the expedition would not reach the goal. On the way, the party met the mountain Papuans, who proved to be an interesting people, and it was not difficult to establish friendly relations with them. As the ascent of the mountains proceeded, the weather became very bad, the temperature was low and continuous fog made it difficult to see the route. The summit was finally reached on Nov. 8. It was impossible to climb the steep wall of rock leading to the peak, but a crevice was finally discovered in the wall through which the explorers forced their way upward. They followed the top of the wall to the summit of the mountain, which is crowned with eternal snow. The hypsometer registered 15,125 ft. The height of Mont Blanc is 15,750 ft. To the north they had an uninterrupted view, for only low mountains stretched to the

horizon. A lake down in the plain below them was named after Lieut. Habbema. The conjectured elevation of this lake is 11,800 feet.

The retreat back to the sea was most exciting and unfortunate. Dr. Lorentz fell into an abyss and was found in a swoon with a broken rib and bruised limbs. A series of misadventures accompanied the party as far as Alkmaar. They were overwhelmed with snow, a number of the men were badly frost-bitten and the party nearly starved. On Dec. 15, they finally arrived at Alkmaar after an absence of sixty-eight days in the primeval mountain forest. The remainder of the journey to the sea was easy.

The expedition secured more proofs, relating especially to the fishes found in the river, that New Guinea belongs to Australia. The botanical results prove that in New Guinea transitions may be found from the genuine tropical to the Alpine flora. The majority of plants have, however, a Malayan character, but there are such a large number of endemic forms that New Guinea and the adjacent islands can be separated from the Sunda Islands as a dominion in itself (Papuasia). On the south coast there are extensive marsh woods, like those found in India. Where the soil is more solid, savannahs were found here and there covered with acacia and other intruders from north Australia. The Alpine flora has a northern character unlike the Australian flora. It resembles that of the mountains of Java, Sumatra and the Himalayas (*Rhododendron*, *Ericaceae*, *Viola*, etc.).

"The south coast consists of a large alluvial plain, sometimes miles in width, cut by a great number of rivers which drain it and bring its abundant waters to the sea. The trend of the hills and mountains is principally east-west, which causes great trouble to explorers, as the ridges cannot be followed, but always have to be crossed. During the expeditions of 1907 and 1909 eruptive rocks were not found. The mountains crossed proved to be of recent formation. The Wilhelmina Peak consists of alveoline limestone. Eruptive rocks have been found near Geelvink Bay. The Wichmann Mountains [about 13 miles S. of Wilhelmina Peak] consist partially of sandstone. Concerning the snow, I may mention that we did not meet with real glaciers—the heat of the tropical sun must prevent their formation—but we found many traces that they have existed. We saw on the top of the Wilhelmina Peak the so-called *firn*.

"A distinction must be made between the Papuans living in the plains near the river and those in the mountains. The river Papuans live chiefly on sago and bananas, and have as animal food, hogs, fish, kangaroos, cassowaries, etc. As sago does not grow in the mountains, these Papuans eat principally yams and bananas, and also hogs, rats, and mice. Both of these tribes live in a typical Stone Age. Their arms are bow and arrows, spear, club and stone axe. Their arrows are not poisoned. None of them wear any clothing; not even the people who live above 10,000 feet. It is remarkable that they do not know the

use of bark. I am not convinced that they are cannibals. I collected about eighty human skulls, and on asking a native where the remaining portions of the skeletons were, he gave me to understand that they were eaten. It is possible that he misunderstood me; still those skulls are valuable from an anthropological point of view, as we can be sure that they belong to a race which is free from mixture with other races. Besides their weapons, they never go out without their bag, containing tools for daily use. They give evidence of great skill in making their canoes with stone axes. I happened to be in their village when they were busy with their work and they soon understood the superiority of iron tools."

CAPTAIN RAWLING'S EXPLORATIONS

The British Ornithologists' Union decided in 1908 to send an expedition to southern Dutch New Guinea to make a collection of its fauna and flora for the British Museum. The immediate goal was the great central Snow Range. Mr. W. Goodfellow, a well-known ornithologist, was appointed leader, botanists and collectors were chosen, and Capt. C. G. Rawling, whose notable surveys and map work in western and southern Tibet have made him well-known, represented the Royal Geographical Society and had charge of the geographical explorations. The following short account of Capt. Rawling's work is condensed from his paper "Explorations in Dutch New Guinea" published in the *Geographical Journal* (Sept. 1911, pp. 233-255, map and ills). The expedition left England in October, 1909, and reached the mouth of the Mimika River, on the south coast of the island ($136^{\circ} 29' \text{ E. Long.}$), early in 1910. Capt. Rawling's explorations, to some extent, supplemented the work of Dr. Lorentz, though their fields were not contiguous. The work of both expeditions extended from the south coast to the central mountains, Lorentz crossing them while Rawling reached their southern edge. The eastern limit of the geographical work of Capt. Rawling was about 100 statute miles west of the western limit of Dr. Lorentz's explorations.

At the mouth of the Mimika River the ship lay three miles out to sea in four fathoms of water. Rawling with two men started in the launch to explore the Mimika River, which is 1,500 yards wide at its mouth. At the third mile they found a great river entering from the west which the natives called the Watuka. It supplies two-thirds of the water reaching the sea and its discovery was a surprise, for Dutch explorers of the lower Mimika, a few years ago, made no reference to the Watuka of which the Mimika is only a tributary.

Crowds of Papuans, men, women and children, put out from the river banks in canoes, shouting a welcome. The village of Wakatimi, on the right bank of the Mimika, about four miles above its

confluence with the Watuka, consists of a long row of about 150 huts built of pandanus and palm leaves with a row of cocoanut trees in front. The women had disappeared, but crowds of men pressed around to gaze upon the strange creatures who had entered their country. The Mimika coast native, almost coal black in color and rather taller than the average European, is physically an almost perfect man, but his brutal features make him very unattractive. The women have little time to think of anything but work. Slaves from childhood, working from daybreak till long after dark in the search for food and to make the man, their master, happy, they rapidly become old, haggard and hideous. No signs of cannibalism were seen.

The natives willingly sold canoes for the ascent of the Mimika. The favorite canoe in these parts is between fifty and sixty feet long, taken from one tree trunk and hollowed by stone axes, fire or old pieces of iron obtained in coastal trading. The labor of making and launching these canoes is enormous. The tree must first be cut down, and as suitable trees are rarely found close to the river bank, a clearing in the forest is made and the great log is dragged to the launching place by the combined strength of the whole village. The hollowing, finishing and decorating are done at the village, the whole process often taking many weeks and even months.

Ascending the Mimika, the furthest navigable point at the village of Parimau was reached on the seventh day out. The ascent was very difficult. One day the river was a swollen torrent, the next a series of pools divided by banks of soft mud, or tangled masses of tree trunks, and over or through these obstructions the heavy laden canoes had to be hauled. When in flood, no bottom could be found with the poles; at low river there was insufficient water to float the canoes. On both banks grew the densest vegetation. Mighty trees fought for existence with thousands of younger growth, the whole held together by a tangled mass of rattan and other creepers.

From Parimau, Rawling and three comrades traveled to the north-north-west to the Kaparé River, seven miles from the mountains. This was believed to be the best route to the mountain region, but as the carriers refused to go further, the party was compelled to return on the third day. As the Kaparé was here 200 yards in width, with great forests and mountains close at hand and the mighty precipice beyond, it was still thought that this route would be best for a forward advance; so Rawling remained to clear the route while Goodfellow returned to Wakatimi to send a party up the Watuka, which was believed, and afterwards proved, to be the lower

course of the Kaparé. Thus it resulted that both the Mimika and the Watuka-Kaparé Rivers were explored.

All attempts to get far up into the mountains failed on account of the tremendous difficulties of the advance, the desertion of the native helpers, the inadequacy of supplies, the decimation of the force of carriers by disease, etc. The explorers, however, cleared an area of forest land at Parimau, from which they had a fine view of the mountains.

"It was easy to fix all the points in the range from Carstensz in the east to Mt. Leonard Darwin in the west. The height of Carstensz, formerly assumed to be about 18,000 feet, was found to be nearly 16,000 feet, while to the west three more great snow peaks were discovered with a height of about 15,400 feet; these we named Mt. Idenburg, after the present Governor-General of the Netherlands India. . . . Beyond and between these two mountains two other great snow peaks were visible, evidence that the ground to the north does not fall abruptly away. But more interesting than all was the discovery that the great range stretching from Carstensz in the east to the Charles Louis Mountains in the west, a distance of eighty miles, formed one immense, unbroken precipice, culminating in its greatest sheer height at Mt. Leonard Darwin (named after the late President of the Royal Geographical Society). We were never in a position to measure with the theodolite a greater sheer height of more than 6,500 feet, but from many views obtained while climbing, I have no hesitation in stating that the greatest perpendicular height is, at this spot, not less than 10,500 feet, or two miles. To the west of Mt. Darwin the range continues to diminish, the precipice dwindling in proportion. To the eye this wall of limestone rock, though split into many sections, appears quite impregnable, a perpendicular wall of dead black stone, relieved by splashes of white where the water catches the rays of the sun."

For seventeen miles to the south of the precipice are two ranges of hills, of an average altitude of 8,000 feet, cut by the great rivers flowing from the north and worn into fantastic shapes. These lower ranges are covered with dense vegetation, the high range behind being bare and barren. The snow line is at about 14,500 feet, the glaciers on Carstensz Peak descending lower and falling over the precipice to the south. Capt. Rawling shares the view of Lieut. Postema of the Dutch navy that Carstensz Peak is not climbable. The wetness of this district is doubtless due to the high altitude and proximity of these mountains, the rainfall being in excess of that in any other part of New Guinea.

Capt. Rawling gives a description of the appearance of these great mountains as seen from the deck of an ocean steamer, moving east along the south coast of Dutch New Guinea:

"We were rapidly approaching a great bluff, the south end of the Charles Louis Range. Changing course eastwards, the whole range of snow-capped mountains was unfolded to our view as the morning mists dispersed. Stretch-

ing in one unbroken line, from the Charles Louis Range on the west to the Orange Range on the east, lay what was then known as the Snowy Range, but which her Majesty the Queen of the Netherlands has been graciously pleased to allow me to name the Nassau Range. Rising to its greatest height in the east at Carstensz Peak, seen by a Dutch Captain of that name in 1623, it runs nearly level for sixty miles to the west, the snows giving place to a mighty precipice, and then gradually falling away to the dividing valley before the Charles Louis Range is met. In front and barring our approach lay range upon range of knife-edged ridges and forest clad mountains broken into sections where cut by the rivers flowing from the north. For fifty miles from the coast lies a dense forest-covered swamp in no spot rising more than a few feet above sea level."

While defeated in their efforts to ascend into the mountains, the expedition succeeded in exploring an important number of rivers, including, besides those already named, the Tuaba, the Kamura and the Wataikwa. The explorations in the lower plain extended for about forty miles east and west between the sea and the mountains. Swamps, jungle or impassable forest cover nearly all the region between the watercourses. The floods of 1910 were probably exceptionally great. The lowlands were almost impassable. The casualties from death and sickness in the expedition were truly appalling. During the first year twelve per cent. of the total force died. Of 300 men employed during the first twelve months only eleven lasted out the expedition, and of these four were Europeans.

On the Upper Kaparé River, Rawling first met the pygmies. These little folk showed no active hostility, but evidently did not desire the white men's company. Their habitations were not seen, but where they were met they had cleared an area of about 120 acres, on which they grew taro and sweet potato. Nine months later Rawling had a better opportunity to study the pygmies at one of their villages. Some forty men or more appeared, but although large bribes were offered for the sight of a woman, none put in an appearance, and their fires that night showed them encamped high up the mountain side. No pygmy woman was ever seen by the expedition, the men refusing to exhibit their wives, even though tempted with the unheard-of price of two axes a woman. Prof. A. C. Haddon, the well-known anthropologist, is inclined to believe that the New Guinea plainsman and the pygmy are of the same aboriginal stock, and that the stronger members of the tribe having seized those districts where food is most abundant, have developed proportionately; while the weaker are not degenerate, but are the true representatives of the original race. In some ways the pygmy seems to be more intelligent than his lowland neighbor. He builds his house on piles and for permanent use. He uses numerals up to

ten, while the plainsman has words for only one and two, any numeral above these being shown by the fingers and toes. The pygmies are the keenest of traders and were willing to exchange everything they possessed, excepting their best arrows, for cloth or a knife.

The expedition lived for over a year among the Papuans of this region and obtained some insight into many of their customs. Marriage is of little importance and was witnessed only on one occasion, when the men who had escorted a bride up a river betook themselves to their homes, while the bride, preceded by an old woman crawled through the mud on her hands and knees and in this degraded position disappeared into her future home. When a person dies the whole population break into a loud wail, and all smear themselves from head to foot with mud. The amount of howling depends upon the importance of the deceased person and is incessant until the corpse is buried. The explorers were surprised by the richness and variety of the singing and chanting. An impromptu song is devised, and the vocalist, bedecked in plumes from the greater bird of paradise, is accompanied by an orchestra of drums, the chorus ending in a shout resembling the bark of a dog and given in unison. These concerts occur on all festive occasions.

Summing up the final results of the expedition Capt. Ràwling says:

"Large and valuable collections of birds, mammals, reptiles, butterflies and moths had been formed together with botanical and ethnographical specimens; a new and unknown race of pygmies discovered, studied, measured, and photographed; a range of mountains, containing the greatest precipice in the world; together with 3,000 square miles of country, surveyed and mapped, new snow-mountains found, and many great rivers explored; and a long stretch of coast-line surveyed. We had accomplished the longest cross-country journey ever undertaken in Dutch New Guinea, *i. e.*, eleven marches from the up-river camp, had proved the impossibility of the Mimika river as a line of advance to the Snows, and on the other hand the value of the great rivers to the east if the same goal is intended. From experience, and our heavy death-roll will bear me out, I have no hesitation in saying, firstly, that the land is an impossible one to any but a Papuan; and secondly, that, unless most carefully picked, no native of the East Indies, with the exception of the Dyaks from Borneo, are of the slightest value as carriers in South Dutch New Guinea."

AUGUST PETERMANN: A REVIEW*

The book is a study of the life work of the famous Gotha geographer and agitator, viewed in relation to the geographical situation of his time. After a brief sketch of Petermann's life the author gives an appreciation of his many-sided activity as a practical geographer, an originator of geographical theories, and a cartographer; and determines his place in the history of German geography.

The "leading motive" in the life and work of this extraordinary man was the passion for the scientific exploration of the earth, the desire to fill up the gaps in our knowledge of the foreign parts of the world regardless of political or material advantages. To obtain this end he picked out the men most fit to do the work, secured the funds necessary to carry it on, and mapped out the lines along which it would bring the best results; as soon as their reports began to come in he worked them up in order to ascertain, map, and publish their results as quickly and widely as possible by means of his *Mitteilungen*. The latter became, in this way, the leading and central organ of the time for all matters pertaining to the progress of exploration regardless of the nationalities of the explorers. Likewise the Perthes Institution developed into the great clearing house for reports of travels and discoveries, rivalling even the corresponding geographical centers of England. •

There was at that time no man in Europe who knew better than Petermann the problems that were still awaiting their solution in the unknown parts of the globe, nor which of these problems must be attacked next, nor who would be the best man for the one which happened to be under consideration. After the great success that he had in the case of Barth, hardly any expedition was organized without his advice. African and Arctic explorations especially received a new impetus through his efforts, most decidedly in Germany, where the geographical interest had long been dormant owing to her deplorable political condition. He was indeed the father of modern German geographical exploration, and he even attempted to put it on a permanent basis by founding a great national German geographical society, after the pattern of the Royal Geographical Society; but this was one of the few enterprises in which he did not succeed.

Aside from this practical work as an organizer and promoter of geographical discovery, he must also be classed among the principal theoretical geographers of Germany. Just as Cuvier, from the few remnants of his marsupial, determined what the whole animal when discovered would look like, thus Petermann divined, from the scant reports of early Australian travelers, the character and climate of the interior of Australia and lived to see his theories justified by later explorers. In a similar way he anticipated much of the geography of central Asia and Africa so that his theories could

* August Petermann. Ein Beitrag zur Geschichte der geographischen Entdeckungen und der Kartographie im 19. Jahrhundert. Anhang I: Petermanns Schule. Anhang II: Bibliographie. Von Dr. phil. E. Weller. x and 284 pp. Vol. IV of "Quellen und Forschungen zur Erd- und Kulturkunde" edited by Dr. R. Stübe. Otto Wiegand, Leipzig, 1911.

serve as a basis for laying out the work of the discoverers in those regions. His pet theories, however, concerned the Polar seas and the Gulf Stream. Keeping at a sane distance from both the Palæocrystic and the Open Polar Sea hypotheses, he arrived, through the comparative study of the physical and meteorological conditions as reported by previous explorers, at the conclusion that only a partly open sea was possible under those high latitudes, and that the American and the Asiatic part of that sea must be very different with regard to the temperatures of their waters, the occurrence of ice, etc. He insisted upon the fact that the character of those regions could not be determined by latitude alone, and that they must be largely modified by the shape and distribution of the land, ocean currents, and similar factors of a purely physical nature, and his propaganda for polar expeditions was not influenced by the search for any north-west passage, but only by the desire to obtain reliable observations for the study of these general physical conditions of the Arctic which must, in their turn, deeply influence the climate of the more southerly latitudes. He therefore pleaded for establishing a number of permanent observation stations all over the Arctic zone, which have now become to some extent an established factor in Polar studies.

Very closely connected with his polar theories and, in fact, at the bottom of much that he said concerning them, was his theory of ocean currents, especially of the Gulf Stream. Although overestimating its influence, he justly recognized it as the cause of the milder climate of Northwestern Europe and the adjoining seas, and to him must be given the credit of having been the first who studied that current not as a local, but as a telluric phenomenon. This must be especially emphasized, because, owing to the fact that his utterances on the subject have never been published as a whole but were widely scattered through many contributions to the *Mitteilungen* and other magazines, he has never received the appreciation for it which he deserved.

Much better known is his work as a cartographer. His Atlas of New Zealand, his nine-sheet map of Australia, his six-sheet map of the United States, were epoch-making in the cartography of those countries, and it was he, too, that made Stieler's Hand Atlas what it is to-day. The superiority of Petermann's maps over other maps of his time was a direct effect of his zeal for scientific exploration. It was only on the map, he believed, that the results of the latter could be clearly expressed. "That which, in a written report, may be circumscribed or considered doubtful, must take a *definite* shape on the map," was his fundamental conviction, and he endeavored, therefore, to give on his maps as accurate as possible a picture of the actual conditions on the surface of the earth. His abilities, fortunately, were adequate to his ambitions. With the latest knowledge about all parts of the world which established the scientific accuracy of his work, he combined the technical skill and refined taste of the master cartographer. These qualities made him the originator of a new style in German cartography the standards of which became the gauge of merit for maps all over Germany, so that the excellence of modern German maps may be directly traced to Petermann's influence.

His limitations are seen in the overestimation of the map: to him, map-making was practically scientific geography itself, and a topographical map which would reproduce exactly every spot of the earth as it is in nature would have meant to him the most valuable result of geographical effort. Such opinions indicate the reaction which had set in against the cosmic specu-

lations of Humboldt and the anthropogeographical theories of Ritter. It is because in either of these fields an enormous amount of positive knowledge of single facts is needed in order to generalize with any claim to accuracy, and that this very basis of the science appeared to him, at the time, rather indefinite and incomplete, that he wanted first of all to make sure of the facts themselves. Thus he holds, in the middle of the nineteenth century, a place entirely by himself, embodying the transition from the old speculative to the new empirical method in geography.

In the first appendix the author tells the story of Petermann's school and his most noteworthy disciples: Ravenstein, Hassenstein, Debes, Friederichsen, Habenicht, and others; the second illustrates the enormous working power of this unique personage, containing a list of his publications no less than 44 pages in length.

As a book of reference on a very interesting and little known phase of geographical life in Germany, the book is a very meritorious addition to the history of modern geography.

MARTHA KRUG GENTHE.

NOTES ON THE DESCRIPTION OF LAND FORMS.—VII.

GEOGRAPHICAL DESCRIPTIONS AS REFLECTIONS OF PREPARATORY EQUIPMENT. An observer ordinarily sees most distinctly and describes most definitely the kinds of things that he already knows most familiarly. This principle has two important corollaries:—first, that the intending observer will do well, before setting out on his travels, to extend his preparatory equipment as far as possible, so as to become familiar with many kinds of things and thus be ready to recognize them at sight; second, that he will do well, when his travels are under way, to give particular attention to the things that do not readily find mental counterparts in his preparatory equipment, for these things may be novelties of special value.

It is instructive, when one reads the description of a distant region, to bear this principle and its corollaries in mind, with a view of discovering the schemes of treatment in which the observer had been previously instructed, and of determining the sufficiency of these schemes for the presentation of the facts that lay before him.

THE ARGENTINE CORDILLERA. F. Kühn. Beiträge zur Kenntnis der Argentinischen Cordillere zwischen 24° und 26° südl. Br. (*Zeitschr. Gesellsch. für Erdk.* Berlin, 1911, 147-172). The difficult journey over the desert highland basins of the Andean Cordillera between Salta in northwest Argentina and Taltal on the Chilean coast offers rich opportunity for the observation and description of a great variety of landscapes, many of which are clearly set forth, for the most part in explanatory terms, in the article above cited. Particularly interesting is Kühn's clear exposition of the striking contrast between the deeply

incised eastern slope of Atlantic drainage, and the many saline basins among the irregular ridges of the lofty interior highland. The eastern slope is characterized by erosional valleys; the highland is frequently occupied by aggradational plains. The eastern valley system that was ascended by Kühn has an open longitudinal stretch (Calcachi valley) discharging southward, with narrower transverse valleys joining it from the west. The longitudinal stretch (3,000 m.) has been aggraded, probably by glacial outwash (?), and now shows two or three terraces, of which the lowest one is 80 m. above the stream, its scarp being much dissected by lateral gulches (barrancas). One of the transverse branch valleys, descending from the southern side of the Nevado de Cachi (6,000 m. +), has been glaciated: it heads in a cirque (4,700 m. ?), below which the floor of the glacial trough has a steep rock step; farther downstream the valley is encumbered with moraines (4,350 m. ?) and by a multitude of erratic boulders (3,400 m.). Another transverse valley, drained by an ungraded stream, shows several alternations between deep-cut, narrow, rock-walled gorges, and more open portions in one of which landslides occupy the valley floor (as if the rock resistance varied along the valley course?); but in its upper part this young valley is continued in a lofty and broadly open trough (4,500 m.) of gentle northward ascent, bordered by broad, round, waste-covered ridges. A lava stream from an unvisited vent to the north lies on the trough floor. To the west, a waste-covered saddle (4,950 m.) affords passage to the interior highland.

The highland, at a general altitude of some 4,000 meters, is a region of ridges and basins; the waste that is removed, chiefly by arid weathering, from the ridges goes to aggrade the basins and hence to diminish the local relief. Stony gravel fans, shown on the route map to be frequently laterally confluent, descend from a high eastern range and stretch in long gentle slopes across a longitudinal depression toward the lower ridges within the highland. The saline mud plains of the basins are described in some detail. Volcanoes and lava flows of recent eruption are abundant, especially along the western border of the highland. The few pasture grounds in the highland are important stopping places for the cattle that are driven over from the Argentine pampas to the lowlands of Chile.

All the physiographic features here mentioned are evidently examples of kinds of things previously known to the observer; and they are very effectively set forth in terms that had become familiar to him by previous study. It is indeed interesting to note how well the terms that he employs appear to serve their purpose. But there are two large questions raised by the facts as thus precepted, to which no explicit answer is found in Kühn's article:—one is the possibility that the Cordillera is a two-cycle mountain range; the other concerns the stage in the arid cycle now reached by the highland basins. The impression gained after a careful reading of Kühn's pages is that these questions remain

unanswered, not because they are unanswerable, not even because their answer is particularly difficult, but because the questions themselves were not raised in the observer's mind; in other words, because the systematic treatment of two-cycle mountain ranges and the theoretical scheme of the evolution of arid regions were not parts of the observer's preparatory equipment.

As to the one- or two-cycle origin of the Cordillera:—its highlands are described as occupying a zone that has suffered folding in combination with powerful upheaval. The ranges often exhibit the most beautiful folded structure (*die schönsten Faltengebirge*, p. 165); but the original surface of deformation is no longer visible, because the ridges have shed their waste to aggrade the depressions. This might be taken to imply that the ranges of the highland were not far advanced in the cycle of erosion that was initiated by the folding of their strata. On the other hand, the rounded, waste-covered ridges that border the lofty, gently sloping, broadly open trough, above the narrow, deeply incised young gorge of one of the eastern transverse valleys, strongly suggests the two-cycle origin of the highlands; the earlier cycle apparently having been initiated by strong deformation, and having advanced during a lower stand of the region far towards old age, before it was interrupted by a broad uplift, with undetermined warping and faulting, whereby the current cycle, now in an early stage, was introduced. This interpretation is supported by what Keidel has reported of other parts of the Argentine Cordillera, and Bowman of the Bolivian. Yet the reader must hesitate to decide definitely in favor of the two-cycle origin of the Cordillera hereabouts, because such an origin is not explicitly announced by the observer; and it is notoriously dangerous to extend an observer's conclusions beyond the reach that he gave them himself.

As to the stage of the arid cycle represented by the highland basins, the reader must again remain in doubt. True, it is clearly set forth that the basins are gaining at the expense of the ridges; that certain valley floors slope two ways from a valley-floor divide; and that there are several independent salt plain basins, as is shown on the neatly drawn route-map. Thus the basins would seem, as a whole, to be in the early stage of arid evolution, represented by many separate initial basins, each of which receives centripetal inwash from its more or less modified initial drainage area; but whether a later stage is here and there attained, involving the incipient integration of arid drainage by the delivery of waste from higher, well-filled basins across low divides to lower basins, accompanied by the trenching of the divides, cannot be made out, interesting as actual examples of this hypothetically inferred stage of evolution would be. This phase of the problem of the arid cycle does not seem to have been presented as a subject for the observer's inquiry; hence his descriptions do not suffice for its safe solution. Another phase of the same problem here encountered is that of the exportation of dust from the interior area by wind action. The wind on the highland is described as prevailingly brisk; wind-

carved rock ledges are mentioned; faceted pebbles are noted on the gravel plains; but dunes are said to be of rare occurrence. In view of the strong relief of the highland borders, and of the way in which the saline mud plains seem to be rising upon the flanks of the ridges that enclose them, the reader may infer that the wash of waste into the basins, aided by the binding action of hygroscopic salts in holding the inwashed waste, prevails over the exportation of dust by the winds, as might be expected by the case in the early stage of the arid cycle already indicated by the occurrence of independent basins; but here again, a word or two in expression of the observer's opinion, based upon what he saw and thought while on the ground, would be a valuable support for a reader's inferences.

Still a third phase of the evolution of a high-level, interior arid highland is passed over without explicit consideration; namely, the stage of encroachment of exterior on interior drainage. The hypothetical aspects of this part of the problem are clear enough: the exterior streams must cut their valleys headward by retrogressive erosion, and must eventually encroach upon the original high-standing interior drainage area. One by one, the interior basins will be captured by exterior streams; their aggraded waste-plains will be rapidly dissected and removed, and their rock floors will be attacked. Some of the high-standing basins of southern Tibet and of western Mexico seem to have been thus invaded by the retrogressive headwaters of exterior rivers; but in Tibet and Mexico as well as in the Andean Cordilleras, the accounts by various observers still leave too much of the story to the imaginative inference of their readers. Yet it would evidently be an aid to a reader who wishes to form a clear picture of an interior highland to know definitely whether the attack of the retrogressive exterior streams is as yet only in so early a stage that the capture of interior drainage is a remote contingency—as would seem to be the case in the district traversed by Kühn; or whether the initial divide around the rim of the interior area has already here and there been pushed inward a little by some of the more aggressive exterior streams; or whether the encroachment has gone on so far that some of the basins are in imminent danger of capture and diversion to exterior drainage systems; or whether some captures have actually taken place, and if so, what advance has been made in the rapid dissection of the waste-plains; for if these stages are correctly interpreted by the observer and correspondingly understood by the reader, the various features that are associated with each stage and implied in its mere mention will go far in enabling the reader to conceive what the observer actually saw. But at present the generalized problem of the cycle of arid erosion is so seldom recognized or taught, that the observers who travel in desert highlands have not yet had opportunity to acquire an understanding of it as part of their preparatory equipment; and various theoretical phases of the arid cycle therefore remain as yet unmatched by their actual counterparts.

It is important to emphasize a certain aspect of the systematic and explanatory treatment of land forms, here advocated. It should be carefully recognized that the object of determining the earlier stages in the history of a mountain range, or the later stages in the history of a highland basin, is not simply in order to know the past condition of the one, or the future condition of the other, but in order better to describe their present condition. The past condition of an existing mountain range is truly in itself an interesting matter for geologists; the future condition of an existing highland basin is also in itself an interesting subject for speculation, though no name has yet been given to the prophetic science to which such a speculation would belong. Why it is that the present form of both the mountain range and the highland basin—a proper subject of geographical study—can be better understood if it is described in terms of the past or the future forms, instead of in terms of itself, will be pointed out in a future Note.

GRUNDZÜGE DER OBERFLÄCHENGESTALTUNG CORNWALLS. H. Spethmann. (*Globus*, xciv, 1908, 329-333, 347-350). This discriminating article describes the upland, the valleys and the coast of Cornwall with greater fullness and with clearer appreciation of modern physiographic methods than does any English article that has come to my attention. The discussion of the means of distinguishing between two possible origins of the upland—as a peneplain of subaerial erosion, now uplifted and submaturely dissected, or as a plain of marine abrasion, similarly uplifted and dissected—is an unusually careful piece of work, revealing elaborately developed theoretical schemes of normal and marine cycles of erosion as a part of the observer's equipment. He concludes that the upland in the Lands End district is a plain of marine abrasion, because the subdued granitic residuals which surmount it do not occupy the whole of the granitic areas; this conclusion being preceded by the explanatory inferences that, if the upland were of subaerial erosion, the borders of the residual elevations ought to coincide with the boundaries of the harder rocks, while if it were of marine abrasion, the border of an unconsumed island might lie well within the boundary of the harder rocks, and might, because of the selective progress of marine abrasion, be very irregular in its alternation between headlands and coves.

These inferences and the conclusions to which they lead afford occasion for emphasizing another general principle of geographical description, as important as the one stated at the beginning of this number of these Notes; namely, that the observer and his readers must have identical or at least similar equipments, if the reports of the former are to be easily understood and fully accepted by the latter. A difficulty arises in the way of accepting some of Spethmann's results, because certain late stages in the marine and the normal cycles of erosion may be conceived differently from his conception of them, as follows:—First, a residual or monadnock surmounting a peneplain (for which

Spethmann suggests the convenient German term, *Härtling*), in a late stage of an undisturbed cycle, may occupy the whole area of the hard rock that determines it, as in the upper block of Fig. 1; but in a still later stage the border of the monadnock may shrink within the boundary of its hard rocks, as in the lower block; and in thus shrinking, many minor irregularities may be developed in its border by reason of slight inequalities in its structure. Hence irregularity of outline and lack of coincidence between the base of a low monadnock and its hard-rock area should not at once be taken as indicative of the marine origin of the surrounding plain.

Second, a residual island may be reduced to a smaller area than that of the hard rocks which determine its survival in an advanced stage of a marine

cycle, but its border must then have a simple outline, free from narrow coves between headlands, because such details are produced by wave attack only in the early stages of the marine cycle; they must disappear in the stages so advanced that the island is subdued to low relief by normal erosion, for selective marine attack is then prevented by the presence of a well-developed beach along the far-retrograded shore line. The facts reported by Spethmann would, therefore, according to my interpretation, reverse his conclusion:—the upland about Lands End may be regarded as of subaerial origin, and the gravels that lie on it, bearing marine fossils, may be regarded as the result of a short-lived submergence after the district had been reduced to low relief by normal erosion.

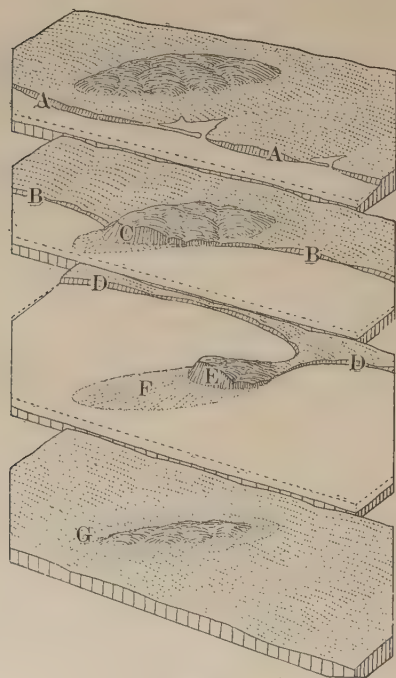


FIG. 1.

There is another means of discriminating between plains of marine and of subaerial degradation, to which little if any attention has been given. If a region of complex structure is attacked by normal and by marine agencies, the marine agencies being aided by a slow depression of the region during their advancing work, then when a monadnock is reached, it will come to form a headland with higher cliffs C, Fig. 1, than those on the weaker rocks near by, B, B. As retrogression of the cliffs continues, the headland will become a peninsula, with cliffed front, E, and a sloping back. If at either of these

stages, elevation should occur, the surface of the greater part of the marine plain, abraded on the less resistant rocks (unshaded in Fig. 1), would be more nearly level than the small part of it which slopes forward from the cliff of the partly destroyed monadnock across the abraded part of its hard rock area. This is more clearly seen in the larger scale of Fig. 2, where A,A represents

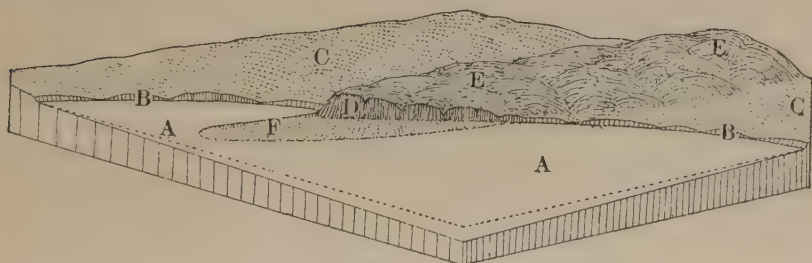


FIG. 2.

the smoothly abraded marine plain; B,B, the low cliffs along the border of the peneplain, C,C; and D, the higher cliffs at the front of the promontory formed by the exposed part of the monadnock-ridge, E,E. Of all these features, the abraded slope F, beveled on the hard rocks of the monadnock, is one of the most significant; its declivity will be about as much steeper than that of the plain, A,A, as the retreat of the higher cliffs, D, is slower than that of the lower cliffs, B,B. Even if no slow submergence accompanies marine abrasion, both the marine plain and the beveled slope must decline gently towards the sea; for the first abraded, outer part of a marine plain will be worn down somewhat while the sea retrogrades the coastal cliffs some miles into the land.

The upshot of this is, that if an upland is described as an uplifted plain of marine abrasion, features such as are shown in Fig. 2 ought to be identified along its inner margin, and especially around the exposed borders of its former headlands and islands. If no such features are found, and if instead the residual reliefs slope gradually down to the neighboring upland surface, with their base at the border of the determining hard-rock area, as in the upper block of Fig. 1, or shrunk inside of the boundary, as in the lower block, then the upland is better described as an uplifted peneplain of normal erosion, even if marine gravels, suggesting a temporary submergence, lie here and there upon it.

W. M. DAVIS.

GEOGRAPHICAL RECORD

AMERICA

THE TOPOGRAPHIC MAP OF NEW YORK STATE. The U. S. Geological Survey has just issued the Antwerp Quadrangle. There have now been published 231 survey sheets of areas in this State. The topographic survey of the State, now very far advanced, has been carried on by the State Engineer's Office and the Federal Survey, each institution paying one-half the expenses of the field work.

During August the topographers of the U. S. Geological Survey made field surveys of 6,517 square miles in various parts of the country, the area surveyed ranging from swamps to high mountains.

WORK ON THE PANAMA CANAL. The total of canal excavation up to Sept. 1, according to the *Canal Record* (Vol. 5, No. 3), was 148,192,759 cubic yards, leaving to be excavated 47,130,620 cubic yards, or less than one-fourth of the entire amount for the completed canal.

PANAMA CANAL ZONE LAND SURVEY. Field work on this Survey has been completed and the data are being collated in the Chief Engineer's office at Culebra. Data have been procured for a general topographical map of the entire Zone except the land that will be covered by water from Gatun and Miraflores Lakes. All the principal ridges, water courses and trails have been located and surveyed, and the maps will show the principal physical features of the country. (*Canal Record*, Vol. 5, No. 3.)

AFRICA

FRENCH MILITARY RECONNAISSANCES IN THE SAHARA SOUTH OF MOROCCO. During the winter of 1904-05, Capt. Flye-Sainte-Marie of the French Army led an expedition into the region lying south and southwest of the oasis of Tuat ($27\frac{1}{2}^{\circ}$ N. and 0°) in order to put an end to the depredations of the tribesmen of southern Morocco, who were in the habit of raiding caravans, especially the salt caravans from Taodeni (22° N. and $3\frac{1}{2}^{\circ}$ W.), on the route from Morocco to Timbuktu. Recently our knowledge of the region lying to the north of that traversed by Capt. Flye-Sainte-Marie has been considerably extended as the result of a similar expedition commanded by Capt. Cancel. The field of operations lay almost entirely in hitherto unexplored territory, the names of some of the springs of which alone were known. The region traversed lies between $29\frac{1}{2}^{\circ}$ and $27\frac{1}{2}^{\circ}$ N. and $5^{\circ} 10'$ and $2^{\circ} 10'$ W. In the southernmost point reached, the spring Boubout, the route touches that followed by Capt. Flye-Sainte-Marie's expedition. Several hitherto unknown springs and pasturages were discovered which will prove important to the caravan trade. The distribution of *erg* (sand desert) and *hamáda* (stony desert) was mapped, and the position was determined of the sand dunes in the Erg Igidi and the Erg Shesh, the two main sand deserts of the western Sahara. Positions were determined astronomically, and meteorological records were kept. (*Pet. Mitt.* Vol. 57, II, p. 150, 1911, based on *Rens. Colon.*, No. 7, pp. 167-178, 1911, with map [listed in *Bull.*, Vol. 43, p. 877].)

BOUNDARY BETWEEN LIBERIA AND THE IVORY COAST. The boundary between Liberia and the French Ivory Coast has been defined by treaty, signed at Paris on January 13, 1911. Capt. Schwartz of the French Army, who served on the Dahomey-Togo boundary commission, was appointed as the representative of the French Government. He left Bordeaux on June 2 and will meet the other members of the commission in Konakry, French Guinea. (*Pet. Mitt.*, Vol. 57, II, p. 150, 1911.)

THE DUKE OF MECKLENBURG'S EXPEDITION IN AFRICA. Duke Adolf Friedrich of Mecklenburg, who in 1907-08 made a very successful journey of exploration in the region of the Virunga Volcanoes and the Great Lakes of Central Africa, has ended his travels of the past year. His party was divided into three sections. The Duke led one of them into the Lake Chad region, crossing the lake from north to south. On Feb. 27 this year his detachment traveled south of Lake Chad into Bagirmi, and on the way he met Gaourang, the Sultan of that country, traveling north to pay his respects to Col. Larjeau, Commander of the Military Territory of the Chad. The French are now building a good wagon road between Fort Lamy and Tchekna, the capital of Bagirmi, and next year they expect to connect the two points by telegraph. All the buildings in Tchekna, even those of the Sultan, are made of straw thatch, and matting forms the partitions between the rooms. The town is surrounded by a high wall of baked clay many feet in height. It has about 10,000 inhabitants. Leaving Tchekna on March 29 the Duke arrived on June 12 at Lokoja, at the confluence of the Niger and Benue. From the Gulf of Guinea the Duke visited the German colony of Togo. He expected to return to Germany about the end of August.

The second detachment, in charge of Dr. Mildbraed and Dr. Schultze, worked in the southern part of Cameroons and are expected to return to Germany in October.

The third detachment, under command of Lieutenant von Wiese and Kaiserwaldau, were detailed for scientific research in the region of the upper Ubangi and of the upper Nile. They arrived on April 1 at Yakoma, a Belgian post at the confluence of the Welle and Bomu Rivers, which together form the Ubangi. They visited the Belgian station of Banzyville on the Ubangi R., a post of superior situation and construction. The houses not only of the Europeans but also of the black soldiery and the workmen are very neatly kept, and many rows of palm trees have been set out in the streets of the settlement. Stretching away from the station, as at most of the Belgian posts, are large rubber plantations.

Leaving Banzyville on May 15 the party crossed the country of the Basa and Baseri. Beyond this region the country is almost without inhabitants, as sleeping sickness has frightened away nearly all who survived its ravages. The Yakoma who live in the large territory surrounding the post of that name are a people of superior intelligence and great industry whose specialty is working in iron. Their products include lance points, knives, razors, etc. Unfortunately sleeping sickness has made great inroads among them, and the Government hospital in the town is continually filled with patients. The species of the tsetse fly that is fatal to live stock is not found in this part of the Belgian Congo. The Government and the people own great herds of cattle. The Government also has at the station forty breeding mares which, with their colts, are in excellent condition. On April 10 this detachment continued its journey towards the Nile, traversing the Bira and Dendi countries. It expected to reach the

Nile by its Bahr-el-Ghasal tributary and then descend the Nile to Khartum on the way home.

GEOLOGICAL EXPEDITION TO THE EAST AFRICAN RIFT VALLEYS. Dr. E. F. Kirschstein, who accompanied the expedition of Duke Adolf Friedrich of Mecklenburg across Africa as geologist, is soon to undertake an independent expedition, the object of which is to study the structure of the two great rift valleys of eastern Africa. He will start from Portuguese East Africa, which has hardly been examined geologically, and will then turn to Lake Nyasa, devoting especial attention to the volcanoes of the Konde district at its northern end. He will then remain for some time in the region between Lakes Nyasa and Tanganyika, where he will examine the Rukwa depression. From here he will proceed to study the western of the two drift valleys in which lie Lakes Tanganyika, Kivu, Edward and Albert. This will lead Dr. Kirschstein to the scene of his former labors, the volcanoes lying north of Lake Kivu, and will afford opportunity for more detailed study. The expedition is planned to last two years. (*Pet. Mitt.*, Vol. 57, II, p. 151, 1911.)

GERMAN EAST AFRICA EXPEDITION OF THE HAMBURG GEOGRAPHICAL SOCIETY. A letter from the leader of the expedition, Dr. E. Obst, dated June 27, 1911, reports that he had spent five weeks in the land of the Wakindigas near Lake Nyarasa ($3\frac{1}{2}^{\circ}$ S. and 35° E.). This people is not a race of pygmies, as supposed. They are of normal stature and of Bantu somatic type. Their language abounds in clicks. They number about one hundred, all told. Geological trips included a visit to the Wembäre depression, and observations were made of its mud volcanoes and the dust storms which occur there daily. (*Pet. Mitt.*, Vol. 57, II, p. 151, 1911.)

ASIA

PROF. MACHATSCHKE'S EXPLORATIONS IN TURKESTAN. During April and May Prof. Machatschek of the University of Vienna has been engaged in exploratory work in Turkestan. Up to the end of May he had completed two trips. The first led from Tashkent up the Chirchik River to Khojakent, where it emerges from the western outliers of the Tian Shan. Following along their base in a southerly direction he reached Khojent on the Syr Darya, which commands the entrance to the basin of Ferghana. From here he proceeded to the east along the southern border of the Chaktal Tau which is fringed with irrigational oases where the larger mountain torrents emerge upon the arid plain lying at its foot. Because of an accident to his companion, Prof. Machatschek was forced to return to Tashkent prematurely. On his second expedition, lasting from May 10 to 25, he followed the post road to the north to Chimkent. Continuing to the N. E. up the headwaters of the Aryss River he reached the classic ground of Central Asiatic exploration where the axis of the Kara Tau diverges to the N. W. from the main range of the Ala Tau with its W. N. W. trend. On his return to Tashkent Prof. Machatschek followed a more easterly route. Shortly after, he started on a third expedition to explore the main range of the Chaktal Tau with a view to elucidating its age and the extent of its former glaciation. At the same time Prof. Machatschek is collecting material for a general geologic map of the western Tian Shan. (*Mitt. Geogr. Gesell. Wien*, Vol. 54, pp. 404-405, 1911.)

JAPANESE IMPROVING THEIR LIVE STOCK. An interesting phase of the economic

development of Japan is the attention that is now being given to the improvement of cattle and horses. Tourists have often observed the scarcity of live stock on Japanese farms. Until recently the Japanese peasants have raised cattle chiefly for draft purposes, not for meat. Europeans in Japanese cities have complained of the scarcity and poor quality of the beef supply. This situation is gradually improving. The Japanese government ("Outlines of Agriculture in Japan," Agric. Bur., Tokyo, 1910) has sent some of its best students of live stock husbandry to this country to study the industry. Some of the best herds of dairy cattle in the United States are now furnishing superior animals to Japan to become the foundations of new herds there. The Japanese have been chiefly fish and rice eaters, but their Government is now recognizing the importance of meat in their diet, and hereafter the live stock industry is to be especially fostered.

Count Okuma in his "Fifty Years of New Japan" (Dutton, New York, 1909), said also that the Government was beginning to do everything in its power to improve Japanese cattle and horses. "Besides Government pastures in which the choicest cows and oxen are kept for breeding purposes, Government officials are sent yearly to Europe and America to purchase prize cattle there so that the native strains may be improved and the agriculturists may be supplied with them." The Government is importing stallions, which are hired out for breeding purposes to farmers at large. In the extensive tracts of pasture land belonging to the Imperial household, cattle and horses of fine quality are now raised, and a number of them are disposed of yearly to farmers for the betterment of the stock. A plan has been formulated for the examination of breeding horses and cattle in order to eliminate those which are not up to a recognized standard.

AUSTRALASIA AND OCEANIA

DR. F. SPEISER'S ETHNOLOGICAL INVESTIGATIONS IN THE NEW HEBRIDES. Dr. F. Speiser has submitted to the Berlin Anthropological Society a first report on his ethnological investigations in the New Hebrides. He began his work on Espiritu Santo, the largest island of the group. On its eastern coast he found the aborigines to be of large stature. They are on the verge of extinction. The mountainous interior of the island Dr. Speiser found inhabited by a race of small stature whose stock is no longer pure. Approaching the west coast he found increasing evidence of admixture with Polynesian blood. After a trip to Nouméa, New Caledonia, where he met Dr. Sarasin, Dr. Speiser returned to the New Hebrides to extend his investigations to other islands of the group, Api, Ambrym, Arbe, etc. (*Pet. Mitt.*, Vol. 57, II, pp. 152, 1911.)

CAPT. KOCH'S EXPLORATIONS IN WESTERN NEW GUINEA. Capt. K. F. Koch, of the Dutch Army, has been exploring the peninsular region of western New Guinea. From Argoeni Bay on the south coast, in 3° S. and 133½° E., he crossed over hills attaining 1,500 ft., followed by swampy districts, to MacCluer Gulf, which he reached near its eastern end at Narénas, at the mouth of the river of the same name. From here he crossed the narrow isthmus lying between MacCluer Gulf and Geelvink Bay, reaching the latter at Windesi. His route, therefore, lay to the south of that followed by Moolenburgh in 1902 and by the Swiss geologist Hirschi in 1906, both of whom had crossed the isthmus at its narrowest part, where it measures only seven miles. After leaving

Windesi, Capt. Koch examined Wandammen Bay, which indents the western shore of Geelvink Bay, and thence returned westward across the isthmus farther south than by his previous route. This involved crossing an abrupt ridge 2,500 ft. high, on whose western flank he reached Koeri Brook, a tributary of the aforementioned Naremas, which he followed to MacCluer Gulf. (*Pet. Mitt.*, Vol. 57, II, p. 152, 1911, based on *Tijd. Kon. Ned. Aardr. Genoot.*, Vol. 20, p. 712, 1911.)

EUROPE

THE ERUPTION OF ETNA. On Sept. 10 earth tremors were recorded at Mineo, a village thirty-five miles southwest of Etna, and for more than fifteen hours slight shocks or tremors were almost incessant. Then followed for twenty-four hours a period of calm interrupted by only one slight disturbance. Tremors were also felt at Linguaglossa, ten miles N. E. of the central crater, but the disturbances gradually became so infrequent and slight that the inhabitants felt little anxiety.

About the time the first tremors were observed black clouds of vapor and volcanic dust were seen to rise from Etna. A new vent was opened at 4.30 A. M. on Sept. 10 on the northern side of the mountain to the N. W. of M. Frumento at a height of about 9,300 feet; a second vent opened at 9.40 A. M. in the neighborhood of M. Nero still further north. Both vents were opened an hour or more after pronounced shocks had occurred and from both openings there issued dense clouds with lapilli, sand and ashes but no lava.

At 12.15 P. M. of the same day a third vent appeared near M. Crozza and still later a fourth near the town of Castiglione Sicilia beyond the northeastern foot of the mountain. Other new vents then opened in rapid succession. There were sixteen in action on Sept. 11, fourteen of which ejected vapor and dust, and the other two, lower down, poured forth lava. On Sept. 13, Prof. Riccò reported that as many as fifty-four vents had opened in the region between M. Rosso, N. N. E. from the summit and about six miles from it, and the craters formed in 1879. The central crater also ejected an immense quantity of ashes covering the surrounding country to a depth of several inches.

There seems to have been no outpouring of lava on the first day; but at 1.30 A. M. on Sept. 11 when there was comparative seismic calm, a new vent opened between M. Rosso and M. Nero at a height of about 5,250 feet, with enormous emission of dust, etc., followed by a stream of lava.

A copious stream of lava issued five hours later from another vent which opened in the same district. The lava streams rapidly descended the steep slope, passed around M. Rosso and then between the lavas of 1646 and 1809, thus assuring the safety of Linguaglossa. The main stream presented a front from twelve to fifteen yards high and from 500 to 600 yards wide. It advanced rapidly, sometimes at the rate of a quarter of a mile an hour, but during the next two or three days its velocity was reduced. By Sept. 13 it had crossed the carriage road and the railroad which passes around the lower slopes of the volcano. On the next day it had approached to within two miles of the Alcantara River which forms the northern boundary of the volcano. On the fifteenth the main stream of lava split into four subsidiary streams and the violence of the eruption perceptibly abated. On Sept. 18, however, the lava stream made another onward movement, but from that time activity rapidly subsided. Prof. Ponte, the vulcanologist of Catania, says that this eruption of Etna was five

times greater than that of 1910 and that more lava was ejected in six days than during the twenty-six days of the disturbance of last year. Some time will probably elapse before a detailed scientific description of the eruption will be available.

PETROLEUM INVESTIGATIONS IN HUNGARY AND RUMANIA. In consequence of the discovery of large quantities of natural gas in Transylvania, the Hungarian Ministry of Finance has commissioned Prof. Lóczy, Director of the Hungarian Geological Survey, and Dr. H. Böckh, professor of geology at the School of Mining and Forestry in Selmeczbánya (Schemnitz) to examine the region with regard to the occurrence of petroleum. With the permission and support of the Rumanian Government the commission is first studying Rumanian oil fields in order to be able to determine by analogy whether the presence of natural gas in Transylvania is indicative of the presence of petroleum in sufficient quantity to justify exploitation. (*Pet. Mitt.*, Vol. 57, II, p. 150, 1911.)

POLAR

PROJECT OF A SPANISH POLAR EXPEDITION. At the meeting of May 7 a plan for a Spanish polar expedition was submitted to the Royal Geographical Society of Madrid by F. J. Gisbert, who is familiar with Arctic conditions from former expeditions. Basing his plan on Nansen's voyage in the *Fram* Señor Gisbert intends to make use of the trans-polar current, starting, however, from a point much farther east, north of the Alaskan coast, in 160° W. long. He counts on three years for the drift to the Greenland Sea and plans to take provisions for five years. Side trips are to be made on sleds which will allow of exploring to a distance of over 100 miles from the ship's position. The cost of the expedition is estimated at \$125,000. A committee has been appointed by the Madrid Geographical Society to examine the project and report as soon as possible on its feasibility and the probability of securing the necessary funds. (*Bol. R. Soc. Geogr.*, Vol. 8, pp. 287-292, Madrid, 1911.)

NORWEGIAN EXPEDITIONS TO SPITZBERGEN. Dr. Reusch of the University of Christiania sends the following information concerning expeditions to Spitzbergen to the *Geographische Zeitschrift* (Vol. 17, pp. 346-347, 1911): A. Hoel of the Geological Survey of Norway and Lieut. A. Staxrud were to conduct an exploratory expedition to Spitzbergen during the past summer, which is to be continued during the summer of 1912. The funds were furnished by the Norwegian government and by private subscribers. A geological examination was to be made of the unsurveyed areas of the northwestern peninsula of West Spitzbergen, enclosed between Wijde Bay and Klas Billen Bay, the northeastern extremity of Ice Fiord, and of the peninsula lying between Ice Fiord and Bell Sound. Photo-topographic surveys were to be made during the past summer of the region lying east of a line connecting Green Harbor and the Fridthiof Glacier on the latter peninsula. The results will be published on a map on the scale of 1:50,000. Several of the trigonometric points determined by the Isachsen expedition in 1909-10 were to be used.

In the summer of 1912 the expedition is to extend its topographic survey to the north of Ice Fiord. The geological investigations will primarily be devoted to an examination of the volcanic district discovered in 1910 near Wood Bay on the northern coast. A special study will be made of the Devonian formations with a view to correlating the Upper Devonian of Mimers Bay with the Lower

Devonian of northern Spitzbergen. The Carboniferous and the dynamo-metamorphic rocks east of St. Johns Bay and between it and Ice Fiord will also receive special attention. The mapping of morainic terraces and the measurement of the rate of movement of the Lilliehöök Glacier will be continued. A detailed survey will be made of several of the glaciers discharging into Cross Bay.

The members of the expedition are divided into four parties of three persons each, two parties being made up of geologists, two of topographers. The former are led by Messrs. Hoel and Holtedahl, the latter by Lieut. Staxrud and A. Koller. All four are experienced men who have already taken part in two or more Spitzbergen expeditions.

A second expedition was sent out early in June by a merchant of Christiania to determine the existence of coal and ore deposits and incidentally to make observations of a geologic and geographic nature. The expedition is well equipped. It has the use of a small vessel with which both the east and west coasts were to be visited. The members were divided into two working groups, one consisting of the geographer B. Jakobsen and two men, the other of three students of mining engineering, R. Marstrander, K. Sörlie and H. N. Ellefsen. Messrs. Jakobsen and Marstrander have accompanied former expeditions.

The construction of a wireless telegraph station on Spitzbergen, permission for which was refused the American company exploiting the coal deposits at Advent Bay, has been undertaken by the Norwegian government itself. The station was to be completed in the autumn. This will end the regular isolation for eight months of a region which is now permanently inhabited.

CONTRIBUTIONS TO THE MAWSON ANTARCTIC EXPEDITION. Despatches from Australia on Sept. 13 announce that the Commonwealth Government will contribute \$25,000, and the Government of New South Wales, \$35,000, towards the expenses of Dr. Mawson's Antarctic Expedition. A number of citizens of Sidney have given altogether \$22,500.

COMMERCIAL GEOGRAPHY

COMMERCE OF THE WORLD IN 1910. The value of the international commerce of the world in 1910 was 32,400 million dollars, which was greater than that of any preceding year and 50 per cent. more than in 1900. The wonderful progress foreign trade has made is clearly shown by the fact that the total value in 1910 is eight times as much as it was in 1850. More than half of all the imports and exports were into or from five nations—Great Britain, Germany, United States, France and The Netherlands. The imports of these nations amounted to 9,103 million dollars, or 54 per cent., and the exports amounted to 7,965 million dollars, or 51.5 per cent. of the total values. Germany increased both its exports and imports from 1900 to 1910 more than any other nation and each of the five leading commercial nations has a larger net increase than any other nation not one of the five.

During the six to eight months of 1911 for which statistics are available there has been an increase of trade in most countries. The ten leading importing countries increased their foreign trade over 400 million dollars. All increased their imports excepting Germany and the United States, and all increased their exports excepting Germany and Italy. The increase in the value of the exports from the United States shows that it has recovered from the

panic of 1907 and may soon regain its place as a close rival of Great Britain for first rank as an exporting nation. In the first eight months of 1911 the increase of exports of the United States was 150 million dollars more than that of Great Britain. These facts are taken from a paper by John J. Macfarlane on "Commerce of the World in 1910," printed in *Commercial America* (October, 1911), and illustrated by diagrams and tables.

PERSONAL

On the occasion of the celebration of the centenary of the University of Christiania in September honorary degrees were conferred on Prof. W. M. Davis and Dr. Charles D. Walcott.

Mr. Harlan I. Smith has been appointed Archæologist by the Governor General of Canada to conduct the Archæological Survey of Canada and have charge of the national archæological collections. His office is in the Victoria Memorial Museum, the national museum of Canada, at Ottawa. Mr. Smith, as American archæologist of the Jesup North Pacific Expedition, conducted archæological explorations in British Columbia which made him one of the best informed men on the antiquities of western Canada. This no doubt was the reason of his appointment. He has contributed to the *Bulletin* on archæological discoveries in Northwestern America, many of which were made by him in the Canadian part of that area. His work will include survey, research and the popular presentation in the museum of the serious facts of Canadian archæology.

Dr. Davis Starr Jordan has been decorated by the Japanese Emperor. Dr. Jordan is at present in Japan.

Dr. Eduard Suess, Professor Emeritus of Geology in the University of Vienna, has retired from the Presidency of the Vienna Academy of Sciences. He recently celebrated his eightieth birthday.

Captain F. Fraser Hunter, I. A., has been appointed Officer in Charge of the Surveyor General's Office, Calcutta, with the rank of Assistant Surveyor General. He is a native of Canada and spent several months last year in this city.

OBITUARY

GENERAL STRAUCH. General Strauch of the Belgian Army, who was appointed by King Leopold II in 1878 as Secretary General of the International African Association and who for twelve years was practically at the head of the management of Belgian interests in the Congo Free State, died in Belgium in June last at the age of eighty-two years.

EDWARD WHYMPER. This great mountaineer died at Chamonix on Sept. 16. A man of versatile talent, he was known as artist, engraver, explorer and mountaineer. He was born in 1840 and came into wide public notice as the first climber of the Matterhorn. Whymper first visited the Alps in 1860, when he was commissioned to make a series of sketches of Alpine scenery. One of the scenes he was to illustrate was the attempt, which proved unsuccessful, of Prof. Bonney and a party to ascend Mont Pelvoux, at that time believed to be the highest peak of the Dauphiné Alps. Whymper then became a mountaineer himself and reached the top of Pelvoux in the following year. He proved that Pelvoux was not the highest peak in Dauphiné but was slightly overtopped by a

neighboring summit which he climbed in 1864. It received the name of the *Pointe des Écrins*. Whymper's ascent of it was regarded as the most remarkable mountaineering feat up to that time. From 1861 to 1865 he was constantly engaged in mountain exploration, especially in the regions of Mont Blanc and the Pennine Alps. Meanwhile the Matterhorn was casting its spell over him, and he made a number of unsuccessful attempts to ascend it from the southwestern or Italian side. Then he turned to the eastern or Swiss side as the more hopeful route, and his final success came in 1865. There was both triumph and tragedy, however, in this great ascent, for four of his companions lost their lives. The story of all his Alpine ascents and explorations is told in his fascinating volume, "*Scrambles among the Alps*," published in 1871 and illustrated by beautiful drawings, most of them executed and some of them engraved by his own hand.

After the tragedy of the Matterhorn, Whymper's energies were mainly devoted to travels and explorations in a wider field. He undertook two expeditions to Greenland, partly for scientific purposes. He next went to Ecuador and in 1880 he added to his many conquests of virgin peaks by two ascents of Chimborazo, the height of which he determined at 20,498 feet. He also spent a night on the summit of Cotopaxi, the loftiest active volcano in the world, reaching, as he ascertained, the height of 19,550 feet. He spent considerable time (1901 to 1905) in exploring and ascending mountains in the Canadian Rockies and Selkirks, and these achievements practically closed his mountaineering career.

PIERRE EMILE LEVASSEUR. Both geography and economic science have sustained a severe loss in the death, in France, of Prof. Levasseur at the age of 83 years. He gave most of his long life to demonstrating the importance of a right appreciation of geography in its application to man, and to the development of economic science. In 1863 he published a "*Précis d'Histoire de France*" and a "*Précis de Géographie*." In these and his many subsequent works he always aimed at the highest precision. He contributed, to an important extent, in building up in his native land a scientific type of geography and always insisted upon the educational value of the subject when so treated. His visit to the United States in 1893 resulted in an important work, "*L'Ouvrier Américain*" and, along the same line of investigation, he deduced important studies on the working classes in France up to the Revolution. A later work dealt with their condition under the Third Empire. He was long noted also as one of the leading statisticians of France, and in his work "*La Population Française*" he not only treated of the geographical aspects of the question but also dealt with it statistically and pointed out the proper use of statistics in all questions of applied geography. One of his excellent popular works was "*Les Alpes et les Grandes Ascensions*."

Erratum. An erroneous statement in the article "The Discoverer of the Philippines," (*Bulletin*, August, p. 591), requires correction. Speaking of the Marianas or Ladrone Islands, the article says that "they now constitute a province of the Philippines, the seat of government being at Guam, the largest island." The United States acquired Guam as a naval station, and Spain sold the remainder of the Marianas to Germany.

GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY)

BOOK REVIEWS AND NOTICES

(The size of books is given in inches to the nearest half inch.)

NORTH AMERICA

Nature Sketches in Temperate America. A Series of Sketches and a Popular Account of Insects, Birds and Plants, Treated from some Aspects of their Evolution and Ecological Relations. By Joseph Lane Hancock, M.D., F.E.S. xviii and 451 pp., illustrations and index. A. C. McClurg & Co., Chicago, 1911. \$2.75. 9 x 6½.

The relation of animal and plant life to their natural surroundings is the controlling theme of this series of popular and suggestive essays brought together by Dr. Hancock in attractive form. The book is definitely planned to introduce the general reader and young student to the philosophy of evolution. To this end a brief discussion of the laws of organic evolution as accepted by the principal workers in the field of biological science to-day forms the introduction to each section, this being followed, in each case, by varied and interesting examples drawn from the author's observations afield, and illustrated by excellent photographs and colored plates. In view of the late utterances on protective coloring and the like from some of our poet-naturalists and recent travelers, Dr. Hancock's chapters on Protective Resemblances, Mimicry, and Warning Colors will be found interesting reading. The book should prove a treasure-house of information and suggestion to the teacher or parent who would lead the younger generation to a real contact with nature and to a realization of the oneness of all life. Its usefulness is increased by a list of the 225 illustrations, as well as by an excellent index and a list of classified habitats of various groups of Orthoptera with definitions of their environing formations.

C. W. HOTCHKISS.

AFRICA

In the Heart of Africa. By The Duke Adolphus Frederick of Mecklenburg. Translated by G. E. Maberly-Oppler. xx and 281 pp., maps and illustrations. Cassell and Co., Ltd., London and New York, 1910. 10 x 7.

One of the best books on any part of Africa in recent years. The expedition made a systematic investigation of the northwestern part of German East Africa, the Central African Rift Valley from Lake Kivu to Lake Albert and the northeastern confines of the Congo State. It was carried out under the leadership of the Duke of Mecklenburg in fourteen months (1907-08). The party had almost unequaled material supplies and a scientific staff of the best quality. The details of the scientific outcome are reserved for the volumes that are to follow this popular report of the work, but the book contains a good summary of the results. A marked feature of the expedition was the great extent and variety of the collections. Such a notable mass of important scientific material has seldom been collected in so short a time.

We find here the first extended account in English of Ruanda, an exceptional country in its ethnographical and geographical position. It is in the northwestern corner of German East Africa and was first described by Dr. Kandt in his admirable book "Caput Nili." The 1,500,000 people are still governed autocratically by a sovereign sultan, for German supremacy in Ruanda is recognized as yet only to a very limited extent. The Duke says that the greater part of Ruanda is finely adapted for colonization by whites who would find cattle raising, agriculture and other industries profitable. The cultivated soil bears rich crops and the climate is fresh and healthful. The high degree of civilization among the Watussi, the pastoral and dominant people, is assisted by the climatic conditions. The malaria-carrying mosquito does not exist there, and the country is the most thickly peopled region in Central Africa.

The expedition made a long sojourn in the regions of Lake Kivu and the Virunga volcanic area to the north of it. Notwithstanding Dr. Kandt's meritorious explorations it has remained largely a *terra incognita* until the present expedition made its detailed studies. The book gives a vivid idea of the volcanoes of which the western group is by far the most interesting. It was the scene of the recent outburst of Mts. Namlagira and Ninagongo. The illustrations include some striking views of these volcanoes in eruption. The eastern and central groups are each composed of three extinct volcanoes. Fifty-five pages are given to discoveries in this district.

The valley of the Semliki River and the great tropical forest, first revealed by Stanley during his Emin relief expedition, through which the Duke's party reached the Congo, are described with the same breadth and variety of information. This is a popular book in the best sense, for it is painstaking in behalf of accurate statement. The very fine illustrations were selected from some 5,000 photographs. The translation from the German is well done.

ASIA

Shans at Home. By Mrs Leslie Milne. With two chapters on Shan History and Literature by the Rev. Wilbur Willis Cochrane. xxiv and 289 pp., illustrations and index. John Murray, London, 1910. 15s. 9 x 6.

Earlier in the year there passed under review the third book which Sir James Scott has written under the title of "The Burman." Mrs. Milne, in her book, has followed his method of treatment and, wherever possible, has extended the incidents of his research into the somewhat alien and certainly ruder culture which has its seat along the upper streams of the Irawadi. Her experience was confined to the North Shan States, and her volume attempts no record of the South Shan States in the valley of the Salwin.

Engaged in linguistic studies Mrs. Milne spent twenty months of three successive years at Hsipaw and Namkham, and the book presents the record of her observation of the daily life of the people with whom she lived. The value of the record lies in the vividness of the note taking. What she saw, that she set down with picturesque attention to detail. The method has led to repetition, a slight defect which a little more care in editing could readily have removed. So, too, when the author essays in a few places to assign some of her notes to their place in general anthropology she is not always successful. But the notes themselves are a brilliant record, full where detail is instructive, clear with the utmost simplicity, above all else they are sympathetic. Almost nowhere does one encounter the superior attitude. Mrs. Milne is at no pains to draw a com-

parison between the Shan and the European, she does not even suggest that they are but a poor folk. Such as they are, living their own lives in the mud where the buffaloes wallow, just such as she saw them she has set them down in a most agreeable record. In these notes we are enabled to follow the Shan from birth to his appointed end through all the daily routine of recurring cares and joys.

Two chapters are contributed by the Rev. Mr. Cochrane, an authority upon the inner relations of the Shans. In reciting the past history of the people he touches rather too lightly upon a number of points over which controversy has been active and of which the solution has yet by no means been determined to the general satisfaction of such as make a study of the history of the folk of this nook of Asia who use the tonal languages. In the chapter on the language, however, he offers an excellent determination of the linguistic position of the people, and his examination of the alphabet displays great acumen.

WILLIAM CHURCHILL.

POLAR

The Voyage of the "Why Not?" in the Antarctic. The Journal of the second French South Polar Expedition, 1908-1910. By Dr. Jean Charcot. English version by Philip Walsh. viii and 315 pp. and numerous illustrations from photographs. Hodder & Stoughton, New York and London.

It is distinctly fortunate for all American and British readers who are interested in travel and exploration but who cannot read French, that Dr. Charcot's account of his last journey has been translated into English. The translation, by Mr. Philip Walsh, is thoroughly well done and may be relied on. The book is well printed on good paper; it has beautiful illustrations, some of which are new; and the only omission is that a special map was not prepared to go with it. The French Edition of this work was reviewed in the *Bulletin*, Vol. 43, pp. 81-90, 1911.

The greatest interest and importance to American geographers, perhaps, of Dr. Charcot's discoveries lies in the fact that they were made in the Antarctic continuation of the American continent. Up to the present time there were accessible to the general reader only two narratives in English of scientific expeditions to this Antarctic continuation of America. The first is Dr. Cook's journal of De Gerlache's exploration of Gerlache Strait and of the drift of the "Belgica" in the pack of West Antarctica: the second is Dr. Nordenskjöld's excellent account of his voyage to the South Shetlands, to Foyen Land, to King Oscar Land, and to Nordenskjöld Land. De Gerlache threw some light on the western coast of the northern mainland of West Antarctica to about 66° S. lat.; Nordenskjöld cleared up the geography of the eastern coast to about 67° S. lat. Beyond these points almost nothing was known, and we must turn to Charcot's book for further information.

Charcot's explorations extended along the west coast of the northern mainland of West Antarctica from the South Shetlands to the 70th parallel of south latitude and then due west along that parallel to about the 123d meridian of west longitude. His discoveries have clinched for physical geographers and geologists the important fact that the colossal range of mountains which, under the names of the Rocky Mountains and the Andes, extends from Alaska to Cape Horn, springs up again in the South Shetlands in 62° S. lat., and continues, through Palmer Land, Danco Land, Graham Land, Loubet Land and Fallières Land, beyond which it disappears into the unknown. Nobody will go in a boat

much further than Charcot in that quarter. Any advance will have to be made with sledges and dogs, and there is little probability of this being done for a good many years to come.

Whether this great mountain range, which may well be called the Antarctic Andes, continues towards East Antarctica or whether it turns westward to die out at the Great Ice Barrier, we do not as yet know. It is one of the few remaining great geographical mysteries. But thanks to Charcot, we can assume, almost to a certainty, that there is land further westward near the 70th parallel in about the 120th meridian of west longitude. And this new land, felt while sounding though not seen by Charcot, may belong to the same formation as the Rocky Mountains and the Andes.

It is possible that this problem may be solved by Charcot himself. For the *Pourquoi-Pas?* has been put in reserve, and if the necessary funds can be raised, as they probably will be, Dr. Charcot intends to start in 1912 to explore at least the coast of this unsighted land, crossing the Antarctic Ocean under sail, so as to reach the pack with his bunkers full of coal. Let us hope he will succeed in his next undertaking as well as he has heretofore. He has already forged many scientific links between America and Antarctica and may forge more. But in any case, American geographers should be grateful to Charcot for what he has already done and it is to be hoped that "The Voyage of the *Why Not?* in the Antarctic" may bring him many friends in this country.

EDWIN SWIFT BALCH.

EDUCATIONAL

A Geography of Ireland. By O. J. R. Howarth, M.A. The Oxford Geographies. Edited by A. J. Herbertson. 224 pp., 47 maps, illustrations and index. Clarendon Press, Oxford, 1911. 2s. 6d. $7\frac{1}{2} \times 5$.

In many respects an island is a most convenient unit for detailed geographical study. This excellent volume certainly justifies that statement. In the physical, historical and economic treatment of the topic, the book is one of the best, thus far, of the Oxford geographies. The student or reader, in Part I, is enabled to learn and account for the structure of the chief physical divisions of Ireland. In Part II his attention is directed to the details of topography and regional description. Human geography is studied in Part III, the book closing with studies of the population, products, agriculture, manufactures and communications. The maps are good but supplementary to larger atlas sheets.

Europe. By H. J. Snape, M.A. Blackie's Causal Geographies Regionally Treated. 190 pp., 6 colored plates, maps, profiles and index. Blackie & Son, Ltd., London, 1911. 2s. $7\frac{1}{2} \times 5$.

This book is one of the results of the excellent influence of the Geographical Association and the Oxford School of Geography upon the methods of teaching the subject in Great Britain. An introductory chapter emphasizes the geographical relationship of Europe and Asia. The comparative method is used throughout. For example, in treating the climate of the British Isles attention is called to the strong resemblance, on a small scale, of the British climate to that of Europe. The book is fairly representative of the great improvement in the methods of treating geographical topics. Considerable emphasis is given to the influence of geographical factors on history. Some of the numerous maps and diagrams are in colors.

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NEW MAPS

EDITED BY THE ASSISTANT EDITOR

System Followed in Listing Maps.

Title. As on original, if possible. If lacking or incomplete, necessary matter enclosed in brackets.

Scale. Natural (unless otherwise on original), followed by equivalent in miles to one inch. If no scale on original, approximate scale enclosed in brackets.

Coordinates. Approximate limiting coordinates of map given. Where map-net lacking, coordinates, if possible of determination, given in brackets. All meridians referred to Greenwich. If map not oriented N., orientation given.

Colors. Number of tints of separate symbols, not number of color printings given. Black or basal color not considered a color.

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Comment. Descriptive and critical. In brackets.

Regional Classification. Major political divisions the unit, as a rule, except for United States and Canada. Boundaries of continents according to Siever's *Länderkunde*, Kleine Ausgabe.

MAPS ISSUED BY UNITED STATES GOVERNMENT BUREAUS

U. S. GEOLOGICAL SURVEY

Topographic Sheets

Alabama. Columbiana Quadrangle. 1:62,500 (1 in.=0.99 mile). 33°15' - 33°0' N.; 86°45' - 86°30' W. Contour interval 50 ft. Surveyed in 1909. Edition of June 1911.

California. (a) Antelope Quad. 1:31,680 (1 in.=0.50 mile). 38°45' - 38°37'30" N.; 121°22'30" - 121°15' W. Interval 5 ft. Surveyed in 1908-09. Edit. of June 1911.

(b) Arcade Quad. 1:31,680. 38°45' - 38°37'30" N.; 121°30' - 121°22'30" W. Interval 5 ft. Surveyed in 1908-09. Edit. of May 1911.

(c) Brighton Quad. 1:31,680. 38°37'30" - 38°30' N.; 121°30' - 121°22'30" W. Interval 5 ft. Surveyed in 1908-09. Edit. of June 1911.

[Belong to the series of half-mile-to-an-inch maps of the Sacramento Valley. Map (c) includes the greater part of the city of Sacramento.]

Idaho. Meadows Quad. 1:125,000 (1 in.=1.97 miles). 45°0' - 44°35' N.; 116°30' - 116°0' W. Interval 100 ft. Surveyed in 1907-09. Edit. of May 1911.

Illinois. La Salle Quad. 1:62,500. 41°30' - 41°15' N.; 89°15' - 89°0' W. Interval 20 ft. Surveyed in 1909. Edit. of May 1911.

Maine. Ellsworth Quad. 1:62,500. 44°45' - 44°30' N.; 68°30' - 68°15' W. Interval 20 ft. Surveyed in 1907-09. Edit. of June 1911.

Maine-New Hampshire. Fryeburg Quad. 1:62,500. 44°15' - 44°0' N.; 71°0' - 70°45' N. Interval 20 feet. Surveyed in 1909. Edit. of June 1911.

Nevada-California. Hawthorne Quad. 1:250,000 (1 in.=3.95 miles). 39° - 38° N.; 119° - 118° W. Interval 100 feet. Surveyed in 1909. Edit. of May 1911.

New York. Antwerp Quad. 1:62,500. 44°15' - 44°0' N.; 75°45' - 75°30' W. Interval 20 ft. Surveyed in 1908-09. Edit. of June 1911.

Ohio. (a) Covington Quad. 1:62,500. 40°15' - 40°0' N.; 84°30' - 84°15' W. Interval 10 ft. Surveyed in 1909. Edit. of June 1911.

(b) Delphos Quad. 1:62,500. 41°0' - 40°45' N.; 84°30' - 84°15' W. Interval 10 ft. Surveyed in 1909. Edit. of June 1911.

(c) Uhrichsville Quad. 1:62,500. 40°30' - 40°15' N.; 81°30' - 81°15' W. Interval 20 ft. Surveyed in 1908-09. Edit. of July 1911.

[Metalled roads shown by a separate symbol, introduced on recent maps.]

Oregon. Crater Lake National Park. 1:62,500. 43°4' - 42°48' N.; 122°16' - 122°0' W. Surveyed in 1908-09. Edit. of June 1911.

[Soundings by M. B. Kerr in 1886, in blue. On reverse illustrations and descriptions of Crater Lake.]

Pennsylvania. Hamburg Quad. 1:62,500. 40°45' - 40°30' N.; 76°0' - 75°45' W. Interval 20 ft. Surveyed in 1908-09. Edit. of June 1911.

Wyoming-Montana. Sheridan Quad. 1:125,000. 45°0' - 44°30' N.; 107°0' - 106°30' W. Interval 100 ft. Surveyed in 1898 and 1909. Edit. of May 1911.

Maps Accompanying Publications

ALABAMA. Sketch map showing location of iron-ore and marble deposits southeast of Calera, Shelby County, Ala. [1:110,000 approx. (1 in. = 1.7 miles approx.)]. 33°5' N. and 86°42' W. Accompanies, as Fig. 1 on p. 4, "Variegated Marble Southeast of Calera, Shelby County, Alabama," by C. Butts in Advance Chapter from Contr. to Econ. Geol., 1910, Part I, *Bull.* 470-G, pp. 3-5, 1911.

ALASKA. (a) Map of the Copper and Chitina Valleys, showing Location of Area Represented on Nizina Special Map. [1 in. = 20 miles (1:126,720)]. 62° - 60° N.; 146½° - 142° W.

(b) Topographic Map of the Nizina District, Alaska. Surveyed in 1908 by D. C. Witherspoon and R. M. La Follette. 1:62,500 (1 in. = 0.99 mile). 61°37' - 61°12' N.; 143°0' - 142°22' W. Latitude and longitude approximate. 2 colors. Edition 1911. [Relief in brown contours; interval 50 ft.]

(c) Geologic Map of the Nizina District, Alaska. Geology by F. H. Moffit and S. R. Capps. Surveyed in 1909. Same scale and coordinates as map (b). With two sections. 9 colors. Edition 1911. Accompany, as Plates I, II and III, "Geology and Mineral Resources of the Nizina District, Alaska," by F. H. Moffit and S. R. Capps, *Bull.* 448, 1911.

CALIFORNIA. Sketch Map of Trinity River Basin, Cal., Showing Areas of Auriferous Gravels of Second and Third Cycles of Erosion. [1 in. = 6 miles (1:380,160)]. 41°0' - 40°15' N.; 123°40' - 122°40' W. Accompanies, as Pl. I, facing p. 8, "The Auriferous Gravels of the Trinity River Basin, Cal.," by J. S. Diller, in Advance Chapter from Contr. to Econ. Geol., 1910, *Bull.* 470-B, pp. 3-21, 1911.

COLORADO. Map showing areas of gypsum in Eagle County, Colo. (From the General Land Office Map of Colorado, 1910.) [1 in. = 12 miles (1:760,320)]. 39°55' - 39°20' N.; 107°25' - 106°10' W. Accompanies, as Fig. 9 on p. 124, "Gypsum Deposits in Eagle County, Colorado," by E. F. Burchard in Advance Chapter from Contr. to Econ. Geol., 1910, Part I, *Bull.* 470-G, pp. 120-131, 1911.

IDAHO. Geologic Map of the Upper St. Joe River Basin, Shoshone County, Idaho. By J. T. Pardee. 1:250,000 (1 in. = 3.05 miles). 47°32' - 46°50' N.; 116°10' - 115°5' W. Accompanies, as Pl. II, facing p. 32, "Geology and Mineralization of the Upper St. Joe River Basin, Idaho," by same author in Advance Chapter from Contr. to Econ. Geol., 1910, *Bull.* 470-B, pp. 31-53, 1911.

[Valuable. Authentic maps of this region hitherto rare.]

KANSAS. Geologic Map of Kansas. Prepared under the direction of Erasmus Haworth, State Geologist. 1909. 1 in. = 24 miles (1:1,520,640). 40° - 37° N.; 102°3' - 94°37' W. 15 colors. Accompanies, as Pl. I, facing p. 24, "Quality of the Water Supplies of Kansas," by H. N. Parker, *Water Supply Paper* 273, 1911.

MASSACHUSETTS. Map of Massachusetts Showing Quarrying Centers. 1:750,000 (1 in. = 11.83 miles). 42°45' - 41°35' N.; 73°30' - 70°30' W. Accompanies, as Pl. I, facing p. 6, "Supplementary Notes on the Commercial Granites of Massachusetts," by T. N. Dale, in Advance Chapter from Contr. to Econ. Geol., 1910, Part I, *Bull.* 470-G, pp. 6-54, 1911.

MONTANA. Reconnaissance Geologic Map of the Elkhorn Mountains, Mont. 1:125,000 (1 in. = 1.97 mile). 46°30' - 46°8' N.; 112°3' - 111°40' W. With section and inset map showing general location. Accompanies, as Pl. II, facing p. 68, "Geologic Relation of Ore Deposits in the Elkhorn Mountains, Mont.," by R. W. Stone in Advance Chapter from Contr. to Econ. Geol., 1910, *Bull.* 470-B, pp. 67-90, 1911.

NEVADA. Sketch map of a portion of west-central Nevada. Adapted from the Reno, Wadsworth, Carson and Wabuska topographic sheets. [1:500,000 approx. (1 in. = 7.9 miles approx.)]. 39°44' - 39°18' N.; 119°50' - 119°10' W. Accompanies, as Fig. 9 on p. 92, "Note on the Economic Geology of the Ramsey, . . . Mining Districts, . . . Nevada," by J. M. Hill in Advance Chapter from Contr. to Econ. Geol., 1910, *Bull.* 470-B, pp. 91-100, 1911.

[Shows location of ore deposits.]

NEW MEXICO. Map showing geologic relations of fissure veins near Pinos Altos, N. Mex. [1:70,000 approx. (1 in. = 1.1 miles approx.)]. 32°30' N. and 108°13' W. Accompanies, as Fig. 10 on p. 102, "The Ore Deposits near Pinos Altos, N. M.," by Sidney Paige in Advance Chapter from Contr. to Econ. Geol., 1910, *Bull.* 470-B, pp. 101-117, 1911.

PENNSYLVANIA. (a) Reconnaissance Map of the Oil and Gas Pools of the Foxburg Quadrangle, Pa., Showing Structure and Producing Areas of the Various Oil Sands. 1:62,500 (1 in. = 0.99 mile). 41°15' - 41°0' N.; 79°45' - 79°30' W. 8 colors. [Shows boundaries of oil and gas pools, location of oil and gas wells and structure contours superimposed on Foxburg topographic sheet (surveyed in 1905-07; contour interval 20 ft.)]

(b) Geologic Map of the Foxburg Quadrangle, Pa., Showing Structure and Coal Outcrops. Geology by E. W. Shaw. Surveyed in 1908. Same scale and coordinates as map (a). 10 colors. [Geology superimposed on topographic sheet. Structure contours shown.]

(c) Sketch Map Showing Thickness, Extent and Structure of the Third or Gordon Sand in the Foxburg Quadrangle, Pa. [1:200,000 approx. (1 in. = 3.1 miles approx.)]. Same coordinates as map (a). 1 color.

(d) Sketch Map of Western Pennsylvania and Parts of Ohio, West Virginia, Maryland and New York, showing oil and gas fields, location of quadrangles and nature of geologic reports published on each. [1 in. = 25 miles (1:1,584,000)]. 42°20' - 39°20' N.; 81°10' - 77°30' W. 3 colors.

(e) Map showing original extent of Vanport limestone members in Foxburg quadrangle. [1:200,000 approx.] Same coordinates as map (a).

Accompany, as Plates X, I (both in pocket), V (facing p. 15), IX (p. 66), and Fig. 3 (p. 30), "Coal, Oil and Gas of the Foxburg Quadrangle, Pa.," by E. W. Shaw and M. J. Munn, *Bull.* 454, 1911.

TEXAS. (a) [Geologic] Map of Central Coastal Plain Region of Texas, Showing Location of Clay Deposits. 1911. [1:1,500,000 approx. (1 in.=23.7 miles approx.)]. 31°20' - 28°10' N.; 99° - 95° W. (b) Map of Clay and Lignite Fields near Lena, Fayette County, Tex. 1911. [1:46,000 approx. (1 in.=0.7 mile approx.)]. [29°53' N. and 97° W.].

Accompany, as Pls. I and II, facing pp. 68 and 74, "Notes on Some Clays from Texas," by A. Deussen in Advance Chapter from Contr. to Econ. Geol., 1910, Part I, *Bull.* 470-G, pp. 68-117, 1911. UTAH. [Nine maps accompanying "Ground Water in Juab, Millard and Iron Counties, Utah" by O. E. Meinzer, *Water Supply Paper* 277, 1911:]

(a) Map of Utah showing areas investigated [and described in *Water-Supply Papers*]. [1:4,600,000 approx. (1 in.=72.6 miles approx.)]. Fig. 1, on p. 10.

(b) Topographic Map of Juab and Millard Counties, Utah, Showing Areas of Flowing Wells. 1911. 1:1,000,000 (1 in.=15.78 miles). 40°0' - 38°35' N.; 114°2' - 111°35' W. 3 colors. Pl. I, facing p. 10.

(c) Topographic Map of Iron County, Utah, Showing Areas of Flowing Wells. 1911. 1:1,000,000. 38°7' - 37°30' N.; 114°3' - 112°35' W. 3 colors. Pl. II, facing p. 16.

(d) Map of Juab, Millard, Beaver and Iron Counties, Utah, showing areas covered by Lake Bonneville. [1:2,300,000 approx. (1 in.=36.3 miles approx.)]. 40° - 37½° N.; 114° - 111½° W. Fig. 2, on p. 17.

(e) Map of Juab Valley, Utah, showing ground water conditions. [1:3,800,000 approx. (1 in.=60.0 miles approx.)]. [39°40' N. and 111°50' W.]. Fig. 9, on p. 68.

(f) [Geologic] Map of Tintic mining district, showing the relation of the water supply to the igneous rocks. [1:94,000 approx. (1 in.=1.5 mile approx.)]. 39°55' N. and 112°5' W. Fig. 10, on p. 83.

(g) Map of Pavant Valley, showing streams, springs and ground-water conditions. [1:357,000 approx. (1 in.=5.6 miles approx.)]. [39°16' - 38°42' N.; 112°35' - 112°7' W.]. Fig. 11, on p. 87.

(h) Map of a part of the south basin of Rush Lake Valley. [1:90,000 approx. (1 in.=1.4 miles approx.)]. 37°38' N. and 113°13' W. Fig. 13, on p. 146.

(i) Topographic Map of Fish Springs Quadrangle, Utah. Surveyed in 1908. 1:250,000 (1 in.=3.95 miles). 40° - 39° N.; 114° - 113° W. 2 colors. 1911. Pl. IV (in pocket).

[On Pls. I and II contours in brown, interval 1,000 ft.; areas of flowing wells in green. Pl. IV standard topographic sheet: contour interval 100 ft. On Fig. 11, contour interval 500 ft.]

U. S. COAST AND GEODETIC SURVEY

Atlantic Coast

Penobscot Bay, Maine. 1:80,000 (1 in.=1.26 miles). Oriented N. 20° E. 44°30' - 43°45' N.; 69°10' - 68°25' W. Chart No. 104. Aug. 1911. 50 cts.

East Penobscot Bay, Maine. 1:40,000 (1 in.=0.63 mile). 44°20.8' - 43°59.4' N.; 68°50.2' - 68°31.6' W. Chart No. 309. Aug. 1911. 25 cts.

Harbors of Plymouth, Kingston and Duxbury, Massachusetts. 1:40,000. 42°5' - 41°55' N.; 70°46' - 70°31' W. Chart No. 338. July 1911. 25 cts.

Provincetown Harbor, Massachusetts. 1:50,000 (1 in.=0.79 mile). 42°6' - 41°56' N.; 70°19' - 70°3' W. Chart No. 341. Aug. 1911. 20 cts.

Fishers Island Sound, Connecticut. 1:20,000. (1 in.=0.32 mile). 41°22' - 41°14.6' N.; 72°3' - 71°49.4' W. Chart No. 358. Aug. 1911. 40 cts.

Connecticut River: Entrance to Deep River. 1:20,000. Oriented N. 33° E. 41°24' - 41°13' N.; 72°25' - 72°15' W. Chart No. 253. July 1911. 25 cts.

Hampton Roads, Virginia. 1:20,000. 37°1.5' - 36°52.5' N.; 76°27' - 76°13.5' W. With inset forming continuation of S.E. corner of map: 36°52.5' - 36°49' N.; 76°21' - 76°16.5' W. Chart No. 400. July 1911. 50 cts.

Pamlico Sound, North Carolina. Eastern Sheet. 1:80,000. Oriented N. 18° E. 35°53' - 35°5' N.; 76°3' - 75°20' W. Chart No. 142. Aug. 1911. 50 cts.

Pacific Coast

Pacific Coast from San Diego to Santa Monica including the Gulf of Santa Catalina, California. 1:200,000 (1 in.=3.16 miles). Oriented N. 28° W. 34°3' - 32°20' N.; 119° - 117° W. Chart No. 5100. June 1911. 50 cts.

Pacific Coast from San Francisco to Point Arena, California. 1:200,000. Oriented N. 26° E. 39°10' - 37°20' N.; 124°30' - 122°10' W. Chart No. 4600. July 1911. 50 cts.

Seacoast and Interior Waters of Washington from Grays Harbor to Semiamoo Bay. 1:300,000. (1 in.=4.73 miles). 49°20' - 46°46' N.; 125°18' - 122°8' W. 1 color (land surface). Chart No. 6400. July 1911. 50 cts.

Wrangell Strait, Alaska. 1:20,000. 56°50.3' - 56°30' N.; 133°1' - 132°53.7' W. In two parts. x color. Chart No. 8170. July 1911. 50 cts.

Pacific Ocean—Philippine Islands

Mangarin and Pandarochan Bays, Southwest Coast of Mindoro. 1:40,000. 12°22' - 12°8' N.; 120°58.5' - 121°15' E. x color. Chart No. 4340. Aug. 1911. 30 cts.

Northeastern Panay and Adjacent Islands. 1:100,000. (1 in.=1.58 mile). 11°51' - 10°54' N.; 122°54' - 123°35' E. x color. Chart No. 4417. Aug. 1911. 40 cts.

(a) Guifan Harbor, South Coast of Samar. 1:20,000. 11°1.7' - 10°59.2' N.; 125°39.1' - 125°44.1' N. x color. (b) Pambujan Harbor, East Coast of Samar. 1:35,000 (1 in.=0.55 mile). 11°18.5' - 11°10.6' N.; 125°31' - 125°40' E. x color. Chart No. 4467. Aug. 1911. 30 cts.

LAKE SURVEY OFFICE

MICHIGAN-ONTARIO. Lower Detroit River showing Available Channel and Positions of Aids to Navigation. Prepared under the direction of Lieut. Col. C. S. Riché, Corps of Engineers, U. S. Army, in 1911. 1:25,000 (1 in.=0.39 miles). 42°9' - 41°57.5' N.; 83°9.6' - 83°5.7' W. 2 colors. Accompanies *Suppl.* No. 3, 1911, to *Bull.* No. 20, Survey of Northern and Northwestern Lakes, 1911.

[WAR DEPARTMENT]

ALASKA. Map of Alaska. By the Alaska Road Commission. 1909. Information compiled from the Surveys of the Alaska Road Commission, the U. S. Coast and Geodetic Survey, the U. S. Geological Survey, U. S. Army Surveys and the Canadian Geological Survey. 1:1,250,000 or 1 in.=19.73 miles. 71½° - 54½° N.; 174° - 138° W. With two insets: (1) Aleutian Islands, 1:2,500,000 or 1 in.=39.46 miles; (2) Pribilof Islands, 1:500,000 (1 in.=28.91 miles). 4 colors. In four sheets.

[Valuable because of its large scale which is twice that of the standard map of Alaska accom-

panying Brooks's monograph (U. S. G. S. *Prof. Pap.* 45). Relief in brown contours; interval approximately 1,000 ft. Shows wagon roads, sled roads, pack trails, railroads, telegraph and telephone lines].

NORTH AMERICA

UNITED STATES

CALIFORNIA. Map of California Showing the Approximate Location of the Principal Mineral Deposits. Compiled by the State Mining Bureau, San Francisco, Cal. Dec. 1910. [1:765,000 approx. (1 in.=12.1 miles approx.)] 2 colors. In two sheets. [48 different mineral deposits indicated].

NEW YORK-ONTARIO. [Map of Niagara Falls]. [1:30,000 approx. (1 in.=0.47 mile)]. Accompanies, on p. 426, "St. Lawrence River and Niagara Falls" by F. Kobayashi, *Journ. of Geogr.* (Tokyo), Vol. 23, pp. 421-428, 1911. [Article and nomenclature of map in Japanese].

MEXICO. [Three meteorologic maps of Mexico for Jan. 1911 entitled:] (1) Distribución de la Temperatura en la República Mexicana. Media Mensual. (2) Frecuencia de la lluvia en la República Mexicana. (3) Precipitación total en la República Mexicana. 1:12,000,000 (1 in.=18.04 miles). 32½° - 14° N.; 117° - 86° W. 1 color. Accompany, as Lam. 1-3, *Bol. Mens. del Observ. Meteorol. Magn. Centr. de Mexico*, Jan. 1911.

[Map (1) shows six degrees of differentiation for temperature, map (2) four degrees for rain and map (3) three degrees for total precipitation. These maps are published monthly as supplements to the *Boletín*.]

SOUTH AMERICA

BRAZIL. Brazil segundo os mais Recentes Trabalhos por R. Hausermann. 1907. 1:10,000,000 (1 in.=157.83 miles). 6° N. - 35° S.; 74° - 33° W. 4 colors. Accompanies "Brazil: Its Natural Riches and Industries," Vol. 1, Comm. d'Expans. Econ. do Brazil. Paris, 1910.

[Good general map. Relief in brown shading; drainage in blue; railroads in black; boundaries in green].

VENEZUELA. (a) Croquis Demostrativo del Estado de los Trabajos del Mapa Físico y Político de Venezuela. 1:5,000,000 (1 in.=78.91 miles). 12½° - 1° N.; 73° - 60° E. 1 color. [Shows stations determined astronomically and area covered by triangulation and topographic survey].

(b) Estado actual de la Triangulación. Mapa Físico y Político de Venezuela. 31 de Diciembre de 1910. 1:500,000 (1 in.=7.89 miles). [Triangulation net].

(c) Plano para el Estudio de la Desviación de la Plomada en La Guaira. 1:50,000 (1 in.=0.79 mile). [Lines of equal deviation of the plumb-line].

Accompany, in pocket, "Trabajos del Cuerpo de Ingenieros encargado del levantamiento del Mapa Físico y Político de Venezuela," Caracas, 1911.

VENEZUELA. (a) Exploración del Camino del "Alto Cocoyar" á Maturín. 1:375,000 (1 in.=5.92 miles).

(b) Exploración de los Caminos que unen á Maturín con Puerto San Juan. 1:125,000 (1 in.=1.97 miles).

(c) Exploración del Río Guarapiche entre Maturín y Caño-Colorado. 1:40,000 (1 in.=0.63 miles).

(d) Camino de Maturín á Caño Colorado. 1:100,000 (1 in.=1.58 miles). Accompany, facing pp. 266, 268 and 270, "Informe de la Comisión sobre el camino de Cumanacoa á Maturín etc." by M. C. Pérez, *Rev. Tecn. del Minist. de Obras Publ.*, Vol. 1, pp. 265-272, Caracas, 1911.

[Route surveys starting from Maturín (9°40' N. and 63° W.)].

VENEZUELA. Centros Pecuarios del Estado Monagas. [No scale. 1:1,200,000 approx. (1 in.=20.5 miles approx.)]. [10°20' - 8°10' N.; 64°0' - 62°5' W.]. 1 color. Accompanies, facing p. 276, "Suplemento al Informe sobre estudio comparativo de las vías del Estado Monagas," *Rev. Tecn. del Minist. de Obras Publ.*, Vol. 1, pp. 275-278, Caracas, 1911.

[Shows cattle markets.]

AFRICA

BRITISH EAST AFRICA. Sketch of the country between the Juba River and Lake Rudolf to illustrate the paper by Lieut. L. Aylmer. 1:500,000, or 1 in.=78.91 miles. 5° N. - 1½° S.; 35½° - 44° E. Accompanies, on p. 291, paper with similar title by same author, *Geogr. Journ.*, Vol. 38, pp. 289-296, 1911.

EGYPT. (a) [Fifteen maps showing location of wells, entitled:] Plan Showing Wells at: Edfu (Plate V); Esna (Pl. VI); Karnak (Pl. VII); Qift (Pl. IX); Qena (Pl. X); Dishna (Pl. XI); Naga Hamadi (Pl. XII); Girga (Pl. XIII); Sohag (Pl. XIV); Tahta (Pl. XVI); Assiut (Pl. XVII); Minia (Pl. XVIII); Beni Suef (Pl. XIX); Wasta (Pl. XX); Giza (Pl. XXI). 1:50,000 (1 in.=0.79 miles). 2 colors.

(b) Map of Upper Egypt Showing Position of Localities from which Data Were Collected. 1907-8. 1:4,000,000 (1 in.=63.13 miles). 32° - 24° N.; 28° - 35° E. (Pl. IV).

Accompany, as indicated above, "The Movements of the Subsoil Water in Upper Egypt" by H. T. Ferrar, *Surv. Dept. Paper No. 19*, Survey Dept. of Egypt, 1911.

[Plates V-XXI are extracts from the topographic map, 1:50,000. Wells indicated by red circles. Pl. IV shows location of places represented in detail on Pls. V-XXI.]

MAURITANIA. (French West Africa.) (a) Région des Salines du Trarza Occidental. [1:15,300,000 approx. (1 in.=83.6 miles approx.)]. [17° N. and 16° W.].

(b) Région des puits d'Agamoun et des Salines de N'Térert et Touidermi. [1:110,000 approx. (1 in.=1.7 mile approx.)]. [Region at N. end of map (a).]

Accompany, on pp. 162 and 163, "Les Salines du Trarza" by G. Mère, *Renseign. Colon.*, No. 7, pp. 161-167, 1911.

MAURITIUS. Carte de l'île Maurice. [1:750,000 approx. (1 in.=11.8 miles approx.)]. [20½° S. and 57½° E.]. Accompanies, on p. 239, "L'Angleterre en Afrique" by E. de Renty, Paris, [1911?]. [Shows roads and railroads of both narrow and standard gauge.]

MOROCCO. Deutsche Ansprüche an Marokko. 1:4,000,000 (1 in.=63.16 miles). 36° - 27½° N.; 13° W. - 0°. 6 colors. Accompanies, as Taf. 11, *Deutsche Erde*, Vol. 10, 1911.

NORTHERN NIGERIA. Northern Nigeria: Divisions administratives. [1:7,450,000 approx. (1 in.=117.6 miles approx.).] 14° - 6° N.; 30° - 15° E. Accompanies, facing p. 188, "L'Angleterre en Afrique" by E. de Renty, Paris, [1911?]. Reproduced from *Quest. Dipl. et Colon.*
[Outline map showing boundaries of provinces.]

SAHARA. Reconnaissance des Compagnies Sahariennes du Touat et de la Saoura dans les Ergs Atimine, Iguidi et la Basse Daoura: nov. 1909-janv. 1910. In three sections. [1:1,600,000 approx. (1 in.=25.2 miles approx.).] 29°40' - 27°0' N.; 5°50' - 1°50' W. With "Carte d'Ensemble" [1:2,900,000 approx. (1 in.=45.8 miles approx.)] showing relationship of sections and index map showing general location. Accompanies, on p. 169, "Dans les Ergs El-Atimine et Iguidi" by Capt. Cancel, *Renseign. Colon.*, No. 7, pp. 167-178, 1911.

SIERRA LEONE. Sierra Leone. [1:2,800,000 approx. (1 in.=44.2 miles approx.).] [11½° - 6° N.; 13½° - 10½° W.] Accompanies, facing p. 219, "L'Angleterre en Afrique" by E. de Renty, Paris, [1911?]. Reproduced from *Quest. Dipl. et Colon.*
[Shows boundaries of districts.]

SOCOTRA. [Geologische Karte von] Sokotra. 1:250,000 (1 in.=3.95 miles). 12½° N. and 54° E. 8 colors. Accompanies, as Taf. 1, "Geologie der Inseln Sokotra, Sémha und Abd El Kûri" by F. Kossmat, *Denkschr. k. Akad. Wiss., Math.-Naturw. Klasse*, Vol. 71, Part 1, pp. 1-62, Vienna, 1907.
[Valuable original map on large scale. Embodies results of Austrian Expedition to Southern Arabia, 1898-99.]

SUDAN. Sketch of a route across Lake Chad by P. A. Talbot, B.A., Feb. 1911. 1:500,000, or 1 inch=7.89 miles. 13°20' - 12°57' N.; 13°46' - 14°40' E. Accompanies, on p. 271, "Lake Chad" by P. A. Talbot, *Geogr. Journ.*, Vol. 38, pp. 269-278, 1911.
[Soundings given.]

SUDAN. [Three maps entitled:] Der Tschadsee in Gegenwart und Vergangenheit. [By A. Bencke]. 1:4,000,000 (1 in.=63.13 miles). 1 color. (1) Denhams Karte, 1822-1824. 15½° - 11° N.; 13° - 17½° E. (2) Nachtigals Karte, 1871-1872. 15° - 11° N.; 12½° - 17° E. (3) Karte des Kapitanen Tilho, 1907. 15° - 11° N.; 12° - 16½° E. Accompany, as separate plate, note on "Die Entwicklung des Tschadsees," *Deutsche Rundsch. für Geogr.*, Vol. 33, p. 541, 1911.

ASIA

BORNEO. Geologisch Overzichtskarte van de landen om de Balik-Papan-Baai. 1:250,000 (1 in.=3.95 miles). [1°5' S. and 116°55' E.] 4 colors. With three sections. Accompanies, as Kaart No. X, paper on "De Omgeving der Balikpapan-Baai" by L. Rutten and C. J. Rutten-Pekelharing, *Tijd. Kon. Nederl. Aardr. Genoot.*, Vol. 28, pp. 579-601, 1911.

CEYLON. [Map of] Ceylon. [1:2,500,000 approx. (1 in.=39.5 miles).] Accompanies, on p. 443, "Nach den Kautschuklanden" by A. H. Berkhout, *Der Tropenpflanzer*, Vol. 15, pp. 436-446, 1911.
[Shows railroads and automobile roads.]

CHINA. (a) Map of the Western Yenchu District. 1:400,000 (1 in.=6.33 miles). [44° - 42° N.; 127½° - 130½° E.] 2 colors. With inset map of Manchuria and N. Korea showing general location. [Diagrammatic map showing chief towns and roads. Nomenclature in English and Chinese.]

(b) Sketch Map of China and Manchuria to illustrate railways in North China and trade routes converging upon Tientsin. [1:9,000,000 approx. (1 in.=142.4 miles approx.).] [54° - 29° N.; 92° - 134° E.] 2 colors. [Shows diagrammatically railroads completed, under construction, projected.]

Accompany: map (a), facing p. 46, Lungchingstun Trade Report, map (b), facing p. 138, Tientsin Trade Report, in Returns of Trade and Trade Reports, 1910, *Imp. Mar. Customs*, Part II. Vol. I, pp. 46-55 and 135-177, respectively, 1911.

CHINA. Map Showing the Distribution of Iron Ore in China. [1:7,000,000 approx. (1 in.=110.5 miles approx.).] 45° - 18° N.; 99° - 124° E. 1 color. Accompanies paper with similar title by K. Inouye, *Journ. of Geogr.* (Tokyo), Vol. 23, pp. 299-311, 1911.
[Paper and nomenclature of map in Japanese.]

FRENCH INDO-CHINA. Indo-Chine Française. 1:9,000,000 (1 in.=142.43 miles). 23½° - 8½° N.; 100° - 110° E. Accompanies "Le Laos" by L. de Reinach, Paris, [1911].

JAPAN. Map of the Usu Volcano Showing the arrangement of the Different Craters. [1:18,000 approx. (1 in.=0.28 mile).] [42°32' N. and 140°50' E.] 1 color. Accompanies, as Pl. IV, "Preliminary Report on the Eruption of Usu Volcano, 1910" by F. Omori, *Journ. of Geogr.* (Tokyo), Vol. 23, pp. 1-20, 1911.

[Paper and nomenclature of map in Japanese. Same map with English nomenclature listed in *Bull.*, Vol. 43, p. 797, 1911.]

JAPAN. Geological Map Showing the Distribution of Stream-Tin in the Environs of the Town of Naegi, Province Mino. [No scale]. [Probably 35°35' N. and 137°25' W.] 3 colors. Accompanies, as Pl. VI, paper with similar title by S. Noda, *Journ. of Geogr.* (Tokyo), Vol. 23, pp. 26-36, 1911.
[Paper and nomenclature of map in Japanese.]

JAPAN. [Map of Esan Volcano]. [1:50,000? (1 in.=0.79 mile).] [41½° N. and 141° E.] Accompanies, on p. 402, paper on "Esan Volcano and Esan Sulphur Mine," by J. Ohikata, *Journ. of Geogr.* (Tokyo), Vol. 23, pp. 399-406, 1911.
[Article and nomenclature of map in Japanese.]

KOREA. Map Showing the Distribution of Iron Ore in Korea. [1:2,000,000 (1 in.=31.56 miles)]. 1 color. Accompanies, as Pl. X, paper with similar title by K. Inouye, *Journ. of Geogr.* (Tokyo), Vol. 23, pp. 97-109, 1911.
[Paper and nomenclature of map in Japanese.]

MANCHURIA. Map Showing the Distribution of Iron Ore in Manchuria. [1:2,200,000 approx. (1 in.=34.7 miles approx.).] [43° - 38½° N.; 121° - 127° E.] 1 color. Accompanies, as Pl. XII, "The Iron Ore of Southern Manchuria," by K. Inouye, *Journ. of Geogr.* (Tokyo), Vol. 23, pp. 164-176, 1911.

AUSTRALIA AND OCEANIA

DUTCH NEW GUINEA. Part of Dutch New Guinea to illustrate the explorations of Captain C. G. Rawling . . . and Mr. E. Marshall . . . of the British Expedition, 1909-11. 1:250,000, or 1 in. = 3.04 miles. 4°0' - 4°55' S.; 136°18' - 137°15' E. With inset map of western New Guinea, 1:10,000,000, showing location of main map. 3 colors. Accompanies, as separate plate, "Explorations in Dutch New Guinea," by C. G. Rawling, *Geogr. Journ.*, Vol. 38, pp. 233-255, 1911.

[Embodies results of explorations of axial range of New Guinea west of those made by Lorentz.]

EUROPE

AUSTRIA. Plateau des Zahmen-Kaisers. 1:25,000 (1 in. = 208.3 ft.). [47°35' N. and 12°17' E.] 4 colors. With inset "Übersichtsplan der Messbandzüge. 1:75,000" and separate plate on tracing paper superimposed on the main map, showing geometric coordinates, etc. Accompany, as Taf. 4a and 4b, "Das Plateau des Zahmen-Kaisers," by L. Distel and F. Scheck, *Mitt. Geogr. Gesell. München*, Vol. 6, pp. 97-166, 1911.

[Detailed survey of a massif of the Tyrolean Alps near the Bavarian frontier.]

AUSTRIA. Übersichtskärtchen der nordsteirischen Alpen im Gebiete der Mürz, Mur und Liesing. Nach den geologischen Aufnahmen von M. Vacek und A. Bittner. [1:230,000 approx. (1 in. = 3.6 miles approx.).] [47°35' - 47°15' N.; 14°45' - 15°30' E.]. Accompanies, on pp. 158-159, "Die Trofaiachlinie . . ." by H. Vettors, *Verhandl. der k.k. geol. Reichsanst.*, No. 7, pp. 151-172, 1911.

FRANCE. Limite de la Montagne dans le Limousin. 1:320,000. (1 in. = 5.05 miles). 45°55' - 45°22' N.; 1°45' - 3°36' E. Accompanies, as Fig. 1, on pp. 318-319, "La Montagne dans le Limousin: Étude de Géographie Humaine," by A. Demangeon, *Ann. de Géogr.*, Vol. 20, pp. 316-337, 1911.

[Boundary of natural region with the above name traced on an extract from sheet 22 (Clermont) of the Carte de France, 1:320,000.]

FRANCE. Carte Aéronautique: Feuille Châlons. Service Géographique de l'Armée. 1:200,000 (1 in. = 3.16 miles). 48°47' - 49°27' N.; 3°41' - 5°23' E. 4 colors. Accompanies, as Pl. XVIII, "La Carte Aéronautique du Service Géographique de l'Armée" by Commandant P. Pollacchi, *Ann. de Géogr.*, Vol. 20, pp. 311-315, 1911.

[A map admirably adapted to the purpose it is intended to serve. It marks a decided advance in aeronaut cartography. It brings out prominently the features of greatest importance to the aeronaut. Relief, although represented, is therefore wisely relegated to second place: the ground plan is made easily legible. Roads stand out in white on a buff back-ground, towns and houses are shown in red, forests in green. Dangerous landing places are specially designated. Prominent points such as belfries, churches, windmills, factory chimneys, isolated trees, have their own symbols. Parking spaces, dirigible and aeroplane sheds are shown. The sheets Paris, Amiens, Mézières are in preparation.]

GERMANY. (a) Koblenz um 1900. 1:300,000 (1 in. = 0.47 miles).

(b) [Extract from Ravenstein's Map of Germany, 1:300,000 (1 in. = 4.73 miles).] 51°5' - 49°37' N.; 6°45' - 9°17' E. 3 colors.

Accompany, as Fig. 1 on p. 17 and as a separate plate, "Kulturgeographische Wanderungen im Koblenzer Verkehrsgebiet," by R. Martiny, *Forsch. zur deutsch. Landes- und Volkskunde*, Vol. 19, No. 3, 1911.

[Map (a) suggestive in its thoroughly geographic treatment of built-up areas. Distinguishes between houses in the old nucleus of the town, apartment houses and private residences in the newer part, and farm-houses on the outskirts.]

GERMANY. Geologische Übersichtskarte Nordwestdeutschlands [1:2,300,000 approx. (1 in. = 36.3 miles approx.).] [55° - 52½° N.; 4½° - 12° E.]. Accompanies, on pp. 104-105, "Der Geologische Aufbau und die Oberflächengestaltung Nordwestdeutschlands" by K. Olbricht, *12. Jahresh. Geogr. Gesell. Hannover*, pp. 87-113, 1911.

[Sketch map in form not fit for publication.]

GERMANY. (a) Nordwestdeutschland, Körper-Geographie. Beispiel: Verbreitung der Färbung. (b) Nordwestdeutschland, Sprach-Geographie. Beispiel: Verbreitung der Hauptmundarten nach Lautstand und Tonfall. (c) Nordwestdeutschland, Sach-Geographie. Beispiel: Verbreitung der Haustypen. Nach den Forschungen von Dr. Willi Pessler. [Maps (a), (b) and (c): 1:4,800,000 approx. (1 in. = 75.8 miles approx.).] 55° - 50½° N.; 2° - 13° E.

(d) Das altsächsische Bauernhaus in Umkreise der Stadt Hannover. Nach den Forschungen von Dr. Willi Pessler. [1:190,000 approx. (1 in. = 3.0 miles approx.) Scale incorrectly given]. 52°30' - 53°11' N.; 9°20' - 10°0' E.

(e) Die Abweichung der altsächsischen Hausgrenze von der niederdeutschen und niedersächsischen Sprachgrenze. [1:3,475,000 approx. (1 in. = 54.8 miles approx.). Scale incorrectly given]. 55° - 50½° N.; 3½° - 17½° E.

(f) Nordwestdeutschland. Versuch einer Karte der verschiedenen Arten des Fensteröffnens. [1:2,750,000 approx. (1 in. = 43.4 miles approx.) Scale incorrectly given]. 54½° - 51° N.; 3½° - 12½° E. Accompany, as Karten 1, 2, 4 and 3, on pp. 3, 5, 11, 8-9, and facing pp. 65 and 81, "Beiträge zur vergleichenden Volkskunde Niedersachsens" by W. Pessler, *12. Jahresh. Geogr. Gesell. Hannover*, pp. 1-86, 1911.

[Maps (a), (b) and (c) show distribution of somatic types, dialects and architectural forms. Map (f) shows distribution of various types of windows. Suggestive with regard to the geographic treatment of such topics.]

GERMANY. [Four maps entitled:] Die Muttersprache der Bevölkerung in den einzelnen Kreisen der Provinz Schleswig-Holstein am 1. Dezember 1905. [1:2,750,000 approx. (1 in. = 43.4 miles approx.).] 55°50' - 53°0' N.; 6° - 13° E. 6 colors. (a) Deutsche Muttersprache; (b) Dänische Muttersprache; (c) Andere fremde Muttersprache; (d) Deutsch und eine fremde Sprache. Accompany, as Taf. I, "Die Preussischen Dänen" by M. Broesike, *Ztschrift. des Königl. Preuss. Statist. Landesamts*, Vol. 51, pp. 73-99, 1911.

HUNGARY. Das Verbreitungsgebiet der deutschen Sprache im Südungarn. Auf Grundlage der Volkszählung vom 31. Dezember 1900. Blatt 1: Gespanschaft Tolnau. Entworfen von Dr. Richard v. Pfandl. [1:200,000 approx. (1 in. = 3.1 miles approx.).] 46°49' - 46°7' N.; 17°44' - 19°2' W. 32 colors. Accompanies, as Taf. 6, "Das Deutsche Sprachgebiet im Südungarn," by same author, *Deutsche Erde*, pp. 68-76, 1911.

HUNGARY. (a) Tektonische Skizze des Zjargebirges und der angrenzenden Gebiete. 1:200,000 (1 in.=3.16 miles). [48°30' N. and 18°40' E.].

(b) Geologische Karte des Zjargebirges und der angrenzenden Gebiete. 1:75,000 (1 in.=1.18 miles). 25 colors.

(c) Geologische Karte des Zjargebirges: Das Gebiet der stärksten Faltung. 1:25,000 (1 in.=0.39 miles). 19 colors.

Accompany, as Fig. 4, on p. 59, and Karten I and II, facing p. 60, "Beiträge zur Geologie des Zjargebirges und des angrenzenden Teiles der Mala Magura in Oberungarn," by H. Vettters, *Denkschr. k. Akad. Wiss., Math.-Naturw. Klasse*, Vol. 85, pp. 1-60, Vienna, 1910.

SCOTLAND. Density of Population of Scotland, 1911 Census. [1:1,300,000 approx. (1 in.=20.5 miles approx.).] 59° - 54°35' N.; 7°30' - 2° W. With inset map of Orkney and Shetland Islands. [1:2-50,000 approx. (1 in.=39.5 miles approx.).] 9 colors. Accompanies "Density of Population, Scotland, 1911," by G. G. Chisholm, *Scott. Geogr. Mag.*, Vol. 27 pp. 466-469, 1911.

[Nine degrees of density indicated. Standard map prepared by the Edinburgh Geographical Institute.]

POLAR

ANTARCTIC REGIONS. Sketch Map of the Northern Peninsula of West Antarctica. 1:7,500,000, or 1 inch=118.37 miles. 63° - 70° S.; 75° - 52° W. Accompanies, on p. 288, "Antarctic Nature, Illustrated by a Description of North-West Antarctica," by O. Nordenskjöld, *Geogr. Journ.*, Vol. 38, pp. 278-289, 1911.

[Valuable: suggests more rational nomenclature.]

WORLD AND LARGER PARTS THEREOF

NORTHERN EURASIA. [Seven maps entitled:] (1) Von einem kalten Gebiete in Russland und Nordasien breiten sich in der Zeit vom 19. bis 26. Februar 1899 verschiedene Kältewellen aus. (2) Kältewelle vom 2. bis 14. November 1902. (3) Von einem kalten Gebiete breitet sich eine Kältewelle aus (12. bis 21. November 1902). (4) Ausbreitung einer Kältewelle in der Zeit vom 11. bis 21. Jänner 1902. (5) Ausbreitung einer Kältewelle in der Zeit vom 20. Mai bis 2. Juni 1899. (6) Wanderung eines barometrischen Steigebietes in der Zeit vom 20. Mai bis 2. Juni 1899. (7) Kältewelle in der Zeit vom 24. bis 31. Oktober 1901. [1:55,000,000 approx. (1 in.=858.0 miles approx.).] 80° - 35° N.; 10° - 180° E. Accompany, as Karten I-VII, "Die Ausbreitung kalter Luft in Russland und Nordasien (Fortschreiten der 'Kältewellen' in Asien-Europa)" by H. v. Ficker, *Sitzungsber. d. kais. Akad. d. Wiss., Math.-Naturw. Klasse*, Vol. 119, Abt. 11a, pp. 1769-1837, Vienna, 1910.

WORLD. [Map of the World Showing] Azimuth and Distance from Tokyo. Mercator projection [equatorial scale 1:100,000,000]. 2 colors. Accompanies, as Pl. XV, paper with similar title by S. Nakamura, *Journ. of Geogr.* (Tokyo), Vol. 23, pp. 327-329, 1911.

[It is regrettable that so many seismologists have followed the example set by Prof. G. Grablowitz in his maps published in *Die Erdbebenwerte* of Laibach, Austria, showing azimuths and distances from given stations to aid in the determination of the seat of earthquakes whose tremors have been recorded on the seismograph. The use of the Mercator projection is here, too, extremely inappropriate. It involves tedious calculation to determine the points of intersection of the azimuths and the circles of distances. The curves resulting from joining these points are far from simple.]

The fact that azimuths are to be shown should have pointed the way to the choice of the right projection, which must, of course, belong to the group of azimuthal projections, the basis of which is a network of concentric circles and radii diverging from their common center. The stereographic projection, with the earthquake station as its pole, will be found to be the best. On it the azimuths and circles of distances constitute the fundamental network of radii and concentric circles of the projection. It represents a graphic solution of the problem far easier than the calculations of the other method, entirely apart from the inappropriateness of the Mercator projection.]

OCEANOGRAPHICAL

NORTH ATLANTIC OCEAN. (a) Courbes de température dans l'Atlantique Nord pendant la période 29 juillet-9 août 1910, d'après les observations du "François Arago." (b) Courbes de température moyenne pendant le mois d'août d'après la *Deutsche Seewarte*. Both maps: Mercator projection [equatorial scale 1:55,000,000 approx.]. 62° - 42° N.; 61° - 10° W. Accompany, as Figs. 3 and 4, on p. 309, "Observations Météorologiques du 'François Arago' au large de Terre-Neuve" by H. Baulig, *Ann. de Géogr.*, Vol. 20, pp. 305-310, 1911.

HISTORICAL

TIBET. (a) Fac-similé de la Figure III de la Carte générale du cours du Gange et du Gagra... publiée par Anquetil-Duperron, en 1784. [5 "milles indiens"=0.84 in.]. [30°40' N.; 81°20' E.]

(b) Fac-similé de la Figure VI de la Carte générale... d'Anquetil-Duperron (Fausse Source du Gange).

Accompany, as Figs. 1 and 2, on pp. 345 and 349, "Une Ancienne Carte des Sources du Gange" by C.-E. Bonin, *Ann. de Géogr.*, Vol. 20, pp. 338-350, 1911.

DUTCH GUIANA. Kaartje van de Corantijn (helift der oorspronkelijke grootte). [1:2,500,000 approx.]. Oriented S. Accompanies, on p. 652, paper on "Twee Reizen van Paramaribo, een naar de Pariama in 1718 en een naar de Boven-Corantijn in 1720" by J. W. IJzeren, *Tijd. Kon. Nederl. Aardr. Genoot.*, Vol. 28, pp. 648-661, 1911.

[Facsimile reduction to half-size of map of Corantijn R., dated 1720.]

EDUCATIONAL

EUROPE. Bathy-Orographical [School Wall] Map of Europe. 1:5,100,000, or 80 [80.49] miles to one inch. 75° - 33° N.; 40° W.-75° E. 13 colors. In two sheets, unmounted. W. & A. K. Johnston, Edinburgh, 9/-.

[A very good physical wall map. Relief is shown on land by eight tints, beginning in green and ending in brown; and, on sea, by five tints of blue. Although the color scheme is pleasing the absence of hachuring precludes the plastic effect of relief seen on the best German wall maps. The nomenclature (provided the use of names on a wall map be deemed justifiable) is critically chosen. This map is one of a series including the continents and oceans.]

ATLASES

HAMMOND'S POCKET ATLAS OF THE WORLD. C. S. Hammond & Co., New York, 1911. 263 pp., 19 plates and statistical tables. 6 x 4.

Contains separate maps of each state and of the Canadian provinces. In content and execution of the usual type of maps produced by the wax-engraving process. The inclusion of a map of the world on Mollweide's projection (referred to as the *only* equivalent projection) and others of world phenomena on Gall's projection testify to incipient, even if casual, contact with geographic thought. But the poor quality of the maps contrasts unfavorably with the up-to-date census statistics and the convenient form and good binding of the atlas.

OTHER ACCESSIONS

OCTOBER, 1911

AMERICA

(The size of books is given in inches to the nearest half inch.)

BASSLER, RAY S. The Cement Resources of Virginia West of the Blue Ridge. (Map and Ills.) Bulletin No. 11-A. Virginia Geological Survey. Charlottesville, University of Virginia, 1909. 10 x 7. *Gift*.

CRIDER, ALBERT F. Cement and Portland Cement Materials of Mississippi. (Map, diagrams and ills.) Bulletin No. 1, Mississippi Geological Survey. Nashville, Brandon Printing Co. 1907. 9½ x 6. *Gift*.

FITCH, MICHAEL HENDRICK. The Chattanooga Campaign, With especial reference to Wisconsin's participation therein. (Map and diagrams.) Wisconsin History Commission: Original Papers, No. 4. [Madison] Wisconsin History Commission, March, 1911. 9 x 6. *Gift*.

GROVER, N. C., and BOLSTER, R. H. Hydrography of Virginia. Geological Series. Bulletin No. III, Geological Survey of Virginia. (Maps and Diagrams.) (Blacksburg), Board of Agriculture and Immigration. 1906. 9 x 6. *Gift*.

HURN, ETHEL ALICE. Wisconsin Women in the War Between the States. Wisconsin History Commission: Original Papers No. 6. (Ills.) [Madison] Wisconsin History Commission, May, 1911. 9 x 6. *Gift*.

JAMISON, C. E. Mineral Resources of Wyoming, and the Mining Laws of the State, and of the United States. Bulletin 1-Series B. Cheyenne, S. A. Bristol Co. 1911. 9 x 6. *Gift*.

LANDES, HENRY. The Road Materials of Washington. (Maps.) Bulletin No. 2. Washington Geological Survey. Olympia, Wash., E. L. Boardman, Public Printer. 1911. 9 x 6. *Gift*.

REEDS, CHESTER ALBERT. A Report on the Geological and Mineral Resources of the Arbuckle Mountains, Oklahoma. (Illustrations and maps.) Bulletin No. 3, Oklahoma Geological Survey. Norman. 1910. 9 x 6. *Gift*.

WATSON, THOMAS LEONARD. Mineral Resources of Virginia. (Maps, diagrams and ills.) Virginia Jamestown Exposition Commission, Lynchburg. 1907. 10½ x 7. *Gift*.

— First Annual Report, State Water Storage Commission. State of Maine. January, 1911. (Maps and ills.) Augusta, Kennebec Journal Print. 1911. 9 x 5½. *Gift*.

— Topographic and Geological Survey of Pennsylvania. 1906-1908. (Maps, diagrams and ills.) Harrisburg, State Printer. 1908. 9½ x 6. *Gift*.

— A Preliminary Report on Drainage Reclamation in Georgia. The Drainage Situation in Georgia, by S. W. McCallie, and Drainage Examinations and Surveys in Georgia by U. S. Department of Agriculture. (Ills.) Bulletin No. 25, Geological Survey of Georgia. (Atlanta, 1911.) 10 x 6½. *Gift*.

AFRICA

HUNT, ARTHUR S. The Oxyrhynchus Papyri. Part VIII. Edited with translations and no notes by —. With Seven Plates. London, Egypt Exploration Fund. 1911. 10½ x 7½.

ASIA

MEREDITH, FREDERICK CHARLES. (Editor and compiler.) *Iti Dalan Ti Santa Nga Krus* (The Way of the Holy Cross). [This book is the first published in the Ilokono dialect in the sub-province of Bontoc, P. I.] Mission of St. Mary the Virgin, Sagada, P. I. 1911. 6 x 4½. *Gift*.

EUROPE

— Jahrbuch des Schweizer Alpenclub. XLVI Jahrgang, 1910-1911. (Ills.) Bern. Schweizer Alpenclub. 1911. 10½ x 7½.

— Klubbütten-Album des Schweizer Alpen-Club. (Beilage zum Jahrbuch S. A. C. Bd. 46.) (Ills.) [Bern] Zentral-Komitee S. A. C. 1911. 7 x 10.

BULLETIN
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JAN MAYEN EXPEDITION OF 1911

BY

W. S. C. RUSSELL

The Jan Mayen Expedition of 1911 was organized by J. Foster Stackhouse, F.R.G.S., F.R.S.S. The party under his command consisted of Mrs. Stackhouse and seventeen men. The destination was Jan Mayen; the object, to make a series of meteorological observations between Iceland and Jan Mayen and to survey the coast of the island for data to supplement the work of the Austrian Expedition of 1882-3. Mr. Stackhouse had had in preparation for some time the construction of a relief map of Jan Mayen and he desired to make a personal observation of the coast lines and take some measurements.

The expedition contained a meteorologist, a zoologist, two ornithologists, a geologist, two color photographers, a botanist, a mountain climber, a cartographer, a cinematograph operator and an artist. A suitable vessel had been chartered, but a short time before the party assembled at Newcastle, England, the charter had to be cancelled through a whim of the owner. We were obliged to take what we could find at short notice,—the *Matador*, 232 tons gross register. She was a private steam yacht, a first-class sea boat, but of insufficient bunker capacity for our purpose. The charter gave a coal capacity of 40 tons. By coaling on the east coast of Iceland and carrying a load on deck, we hoped to reach the island and have a few days for work on the coast survey, providing the waters were free from ice.

We sailed from Newcastle at 6 A.M., July 30. The course was laid through the Orkney Islands, and the Faroes to Seydisfjord, Ice-

land, that we might easily reach a coaling station in case of stress of weather, which would prematurely deplete our coal supply. We had on board the Icelandic mail and carried an expedition flag, modelled after that of the Arctic Club of America, with the British Jack in place of the Stars and Stripes. We left the mail at Seydisfjord on Aug. 3, and coaled. We here made the distressing discovery that in place of forty tons, as stated in the charter, our bunkers held only twenty-four tons.

A violent storm on the east coast of Iceland detained us in port two days. During this time the botanist, the ornithologist and the



FIG. 1.—Map of Jan Mayen based on the map of the Austrian Expedition of 1882-83. 1:500,000 (1 in. = 7.89 miles). The full line accompanied by arrows indicates the course of the *Matador*, August 11-12, 1911.

geologist explored the valley at the end of the ford and the mountains on either side. A large amount of good material was collected for the museums represented by the expedition. Among the minerals was an excellent meteorite, which, as far as we knew, was the first one ever reported from Iceland. It is now in the private collection of Baron Axel Klinckowström in Stockholm.

Early on Aug. 5, we put to sea with the storm still raging. During the afternoon the wind continually increased and the sea became so

heavy that we sought the shelter of Langanes, the northeast point of Iceland. Here we were held for 36 hours in the open bay of Eidisvik. During this period the scientists continued their collections and fully explored the peninsula. The most noticeable feature is the driftwood. There were many logs of great size, some of which bore the marks of the ax, but most of them had been torn up by the roots in spring freshets and swept out to sea. They are of the same character as those I afterwards examined in Driftwood Bay, Jan Mayen. This material evidently came from the great Siberian rivers. Carried out to sea with the spring floods, they became embedded in the ice and slowly drifted with the pack ice as did the *Fram* with Dr. Nansen and the Melville-Bryant Cask No. 6, deposited on the ice



FIG. 2.—Entrance to Driftwood Bay. Heavy fog hanging over Beerenberg.

off Point Barrow, Sept. 13, 1899 and picked up by an Iclander at Cape Raudagnupr, northwest of Eidisvik, on June, 1905. All this material must have drifted to the north of Franz Josef Land and Spitzbergen. It then met the more open ice stream that comes down east of Greenland and drifted southward, some of it landing on Jan Mayen and some of it in this bleak bay. The water-worn and ice-scarred timber provides sufficient material for the Icelanders of the north to construct their houses and furnishes an abundant amount of fuel. Much of it is transported into the interior, still more is left upon the shore to decay or again be washed out to sea to find lodgment in the Faroe Islands.

The state of the weather, the condition of the sea and the short-

ened supply of coal seemed to forbid our further progress. We held a consultation, and it was voted to return to one of the eastern fiords, recoal and then, if the sea did not improve, to set south to the Westmann Islands and devote a week to cartographical and geological work. While the coast line of Iceland has been carefully surveyed by the Danes, the Westmann Islands have been neglected and there is opportunity for scientific work there.

A little after midnight on Aug. 8, we entered Faskrudsfjord. We were unable to coal at once as the *Ask* was tied up to the only jetty. The day was, however, profitably spent. Among geologists, Iceland is famed for zeolites. I have collected many fine specimens in the

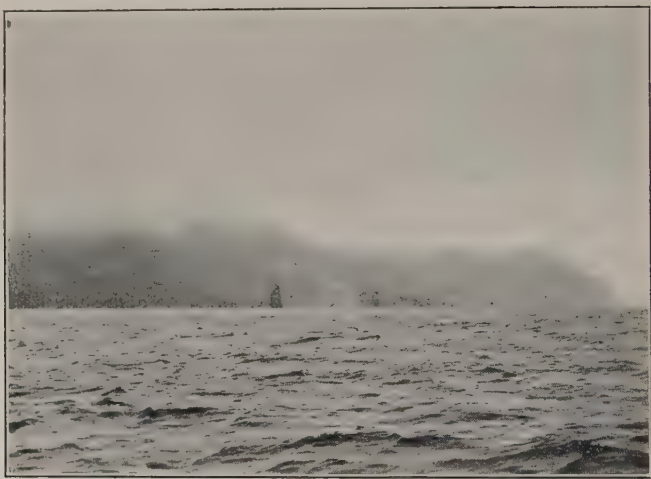


FIG. 3.—General character of the Jan Mayen coast, rising straight up from the sea. Pilot Boat Rock, the dark pinnacle of rock rising from the sea in the middle of the picture.

interior during a trip of over 1,000 miles, but I have never seen such excellent specimens as I dug out of the bed of a brook which flows down a ravine here, formed by a fault in the lava. We also obtained another specimen very rare in Iceland, of fossilized wood of the Tertiary Period. The specimen was filled with minute zeolites.

We learned by telephone that weather conditions north of Iceland were a little more favorable. With our bunkers full and a good deck load we decided to make one more attempt to reach Jan Mayen. We crossed the Arctic Circle, blew the whistle, and cast overboard a record in a sealed bottle. Hourly observations of air and sea temperatures, the reading of the barometer, direction and velocity of

the wind, compass course and log dial were taken. The velocity of the wind increased and the *Matador* was tossed about so much that we spread all the sail possible to steady the ship. The water temperature steadily decreased but no ice was in sight. Our Icelandic friends warned us that there was much ice in the north waters.

At midday, Aug. 11, a bank of fog loomed in the north. In it somewhere we knew must lie Jan Mayen. A little later we got a glimpse of South Cape and changed our course to bring us just east of the land. Bird life was very abundant and the birds being unacquainted with man flew fearlessly about us and through the rigging. We did not, however, like the French expedition of 1892, "have to push them out of the way to make progress."

When we reached Vienna Cape, the fog lifted so as to give us a view of the summits of the southern craters. The sun shone brightly on Driftwood Bay just ahead and we hoped for a view of Beerenberg. Slowly we steamed close to the shore. A series of photographs was taken to form a full panorama and many sketches and bearings were taken. Everyone was busy.

Reaching Jameson Bay we tried to land but found it impossible on account of the heavy breakers. Turning back to Driftwood Bay we anchored opposite the South Lagoon. It seemed impossible to make a safe landing but Stackhouse, Beetham, Swan and the writer volunteered to make the attempt. We pulled the gig to the edge of the breakers. The sea was running so high that when we were in the trough of the sea we were invisible from the deck of the *Matador*. Slowly we worked southward, past Pilot-Boat Rock to the cliffs near Cape Traill but with no success. This was also the experience of *La Manche* party in 1892. Longingly we examined the heaps of driftwood and thought of the big bonfire we were to make to dry out the fog and spray and efface the chill of the past three days. The ragged lava ridges patched with snow, the gullied mounds of ashes spotted with pale green moss, the abundance of fearless birds flitting between us and the shore, the water courses rushing down from the melting snows, the beautiful sunlight on the beach, the quiet, lonesome beauty of the stately cliffs, the impenetrable fog shrouding the upper peaks, these were the elements of charm on a dreary, lonesome coast, that lured us across the breakers. But prudence forbade. After a long pull we regained the *Matador*. During our absence the guns had been busy and a large number of birds were strewn over the deck awaiting the knives of the taxidermists.

It was 9 P.M. For hours we had cast wistful eyes towards Beerenberg, the most northern volcano in the world, rising 8,000 feet above

the sea. Beerenberg is a rare, a magnificent spectacle. For a few moments the fog opened near the summit, though the middle portion of its glacier-covered slopes was hidden. The sun shone resplendent on the mighty dome of ice, suspended like a truncated cone, apparently in mid air. Then the curtains were swiftly drawn and we were not again to see the wonders of that view from the east. At the same time the fog lifted from the lower and mid-slopes and we saw only the mighty glaciers reaching down from the mist into the pounding surf.

At midnight we rounded Northeast Cape with the sun shining brightly and obtained a momentary view of the summit towards the south but nothing, not even the grandeur of this view, can equal the



FIG. 4—Cape Traill.

splendor of that eastern vision. Slowly we proceeded around the entire coast, hoping to effect a landing at Mary Muss Bay, the home of the Austrian Expedition. The heavy sea prevented. The Austrian station buildings, partly covered with sand, loomed in the mist. We planned to wait a few days here for the sea to subside that we might land some supplies we had taken to leave in the station and report upon the condition of those left by the Austrians twenty-eight years ago. We made a careful estimate of our coal and were dismayed to find that we had a scant supply to reach the Iceland coast. We decided to start at once. The wisdom of this decision was shown some days later when we steamed into Seydisfjörd with only enough coal left to steam two hours. For some time before our departure

we blew our whistle continuously on the chance that there might be some shipwrecked fishermen waiting for a friendly ship to take them back to inhabited lands.

We saw no sea ice of any description around Jan Mayen. The waters were entirely free. Nor was there any ice blink to indicate the presence of ice beyond the horizon. I am unable to find any record of such free water about Jan Mayen as we experienced. Some expeditions have failed to get nearer than thirty miles of the land on account of the ice barrier.

The island is entirely volcanic and of the same formation as the Reykjanes Peninsula in Iceland. If there is any subterranean connection between the two islands it is very deep seated, for the sea is 1,000 fathoms deep a little to the south of Jan Mayen. A remark-



FIG. 5—Sunlight through the rifted fog lying low off the east of Iceland.

able thing about the formation of the island, which is about thirty miles long, is the great depth of water but a little way from the shore. Its volcano comes straight up from this great deep and the fifteen miles of lava ridge south of it is but the overflow of lava, reaching southward like the bone in a lamb chop. The mountain is entirely covered with glaciers, which are fed by the continually falling snows, the condensation of the heavy fogs that perpetually envelop its cold and lofty summit.

Botanically, ornithologically and geologically we thoroughly explored three of the fiords of the east coast of Iceland. One of them, Brimnesfjord, is little known, an elevated, glacial valley. We secured many museum specimens.

We established the fact that ice-free waters do sometimes exist

entirely around Jan Mayen, the charts and the records to the contrary.

We secured a valuable collection of photographs and sketches of the entire east coast and made cinematograph pictures of the shore and the glaciers as we steamed along.

We made a complete meteorological record across the ocean from Langanes to Jan Mayen and return. Taken in connection with the work done by *La Manche* these data are useful. Says the commander of that expedition: "A series of observations is important, but it is only one point of the changing series of seasons, and science has great interest in reviewing the work done ten years ago." Our records were taken nineteen years after those of *La Manche* so that we now have three "points" with enough time between to make them scientifically valuable for comparison, being taken over the same stretch of sea at the same time of the year. A table is given below for comparison of the last two "points."

We failed to land, but the mere act of landing without time to do systematic work would have been useless. We might have taken some of the twenty tons of coal left by the Austrians but this would have been a crime. This coal is for the relief of shipwrecked mariners or for any party wishing to winter.

READINGS OF BAROMETER, TEMPERATURE OF THE AIR AND OF THE SEA FROM
LANGANES, NORTHEAST COAST OF ICELAND, TO JAN MAYEN.
STEAM YACHT *Matador*, AUGUST 10-12, 1911.

DATE.	HOUR.	POSITION		BAROMETER.	TEMPERATURE	
		LAT.	LONG.		AIR.	SEA.
August 10	5 A.M.	66° 30' N.	14° 30' W.	762.0 mm	5.8° C.	6.3° C.
	7 A.M.			761.49	6.0°	7.2°
	12 M.	67° 15'	13° 15'	761.5	5.5°	6.4°
	2 P.M.			762.0	6.0°	7.5°
	9 P.M.			762.25	4.3°	7.2°
August 11	12 A.M.	68° 45'	11° 30'	763.01	5.3°	6.5°
	7 A.M.			763.27	5.2°	6.5°
	12 M.	69° 10'	9° 45'	765.82	5.0°	6.1°
	2 P.M.	off South Cape		765.82	5.0°	5.5°
	6 P.M.	{ 70° 57' 8° 30' }		765.82	6.0°	3.5°
		{ Driftwood Bay }				
	9 P.M.			766.57	5.0°	4.3°
August 12	12 A.M.	{ 71° 12' 7° 57' }		765.82	6.0°	3.5°
		{ Northeast Cape }				
	3 A.M.	{ 71° 0' 8° 30' }		766.06	5.4°	5.0°
		{ Mary Muss Bay }				
	6 A.M.	{ 70° 50' 9° 3' }		766.06	6.2°	6.0°
		{ Southwest Cape }				
	7 A.M.			766.06	6.5°	6.0°
	2 P.M.			767.08	8.0°	7.2°
	9 P.M.			767.08	7.7°	7.0°

NOTES.

A comparison of the barometer readings of 1882-3, 1892 and 1911 for the corresponding season of the year yields interesting results.

Mean Barometer in August, 1882.....	754.87 mm.
“ “ “ “ 1892.....	763.5
“ “ “ “ 1911.....	766.92

The Isobar for this season and locality is charted by Davis as 756.92. Our mean barometer reading for two weeks off the east coast of Iceland was..... 756.66, which corresponds to the given Isobar.

Again, there seems to be a great ocean eddy between Langanes and Jan Mayen as shown by our sea temperatures, state of the sea and winds. The data cannot be given here for the deduction. The limits of this eddy are fifty miles north of Iceland and fifty miles south of Jan Mayen. The south flowing Arctic Stream along the east Greenland coast, and the northwest drift of waters off the west coast of Norway undoubtedly contribute to this condition.

HISTORICAL.

1607. HENRY HUDSON is usually credited with the discovery, having found the island on his return from Spitzbergen. It was long known as "Hudson's Touches."
1610. CORNELIUS DOETTS, a Dutchman, discovered the island, according to a chart printed at Amsterdam by Dirck Peters, which is now in the Museum of Bergen.
1611. JAN MAYEN, a Dutchman, discovered the island, according to one authority, and gave it his name. By this name it has been known since 1611.
- 1611-1690. Jan Mayen was a station for the Holland Whale Fishery. See *The Dutch in the Arctic Seas*, by S. R. Van Campen, for a full account.
- 1633-34. Seven Dutch sailors tried to winter on Jan Mayen. All died of scurvy.
1817. WILLIAM SCORESBY, Jr., roughly surveyed the island and wrote a brief account.
1856. LORD DUFFERIN, in the *Foam*, visited the island and landed for a few moments, after a hard fight with the ice. He did no scientific work.
1856. LA RONCIÈRE, a Frenchman, in the *Reine-Hortense*, closely following Dufferin, gave up the attempt when about 125 miles from the island on account of coal shortage.
1861. DR. BERNA, German, made a landing, but retreated on the sudden rising of the sea.
1869. KOLDEWAY, German, in the *Germania*, tried to land, but failed on account of the heavy sea.
- 1882-3. WOHLGEMUTH, in the *Pola*, established one of the thirteen International Circumpolar Stations in Mary Muss Bay on the 71st parallel. The party were chiefly engaged in meteorological work. They surveyed the island and constructed a fairly accurate chart. Our observations in 1911 show many inaccuracies.
1899. A. G. NATHORST, a Swede, on his expedition to the east coast of Greenland and Spitzbergen, stopped at Jan Mayen for a few hours.

1891. CHARLES RABOT, a Frenchman, in the *Châteaurenault*, starting from the French fishing station in Faskrudsfjord on the east coast of Iceland, was turned back by the ice barrier. He was accompanied by Auguste Gratzl, an Austrian, of the expedition of 1882-3. Their object was to examine the condition of the stores left there in 1883.*
1892. BIENAIMÉ and RABOT, French, again accompanied by Gratzl, in the *Manche*, visited Jan Mayen, entered Mary Muss Bay, and effected a landing on the 27th of July. They stopped but a few hours.
1911. STACKHOUSE Expedition in the *Matador* reached the island on August 11th. It is the purpose of this party to return in 1912, complete the survey of the land, make ocean soundings and, if the ice permits, make the Liverpool coast of Greenland.

* Greely, Handbook of Arctic Exploration, in referring to this expedition, places Faskrudsfjord, a fiord in Iceland, in Jan Mayen.

HANGING VALLEYS OF THE YOSEMITE*

BY

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COMPARISON OF THE YOSEMITE WITH OTHER VALLEYS.

The Yosemite Valley has often been compared with other valleys in an attempt to throw light on the question of its origin. Such comparison, to be of value in the present discussion, must be made between similar valleys which are known to have developed under different conditions. It is clearly inadmissible, for example, to compare the Yosemite with other similar valleys which have also been occupied by glaciers; or with V-shaped gorges in non-glacial regions. For this reason the comparisons mentioned by Turner (318-319) all seem to me inappropriate. So far as can be learned from maps and descriptions, every one of the valleys mentioned by him was either certainly or probably occupied by ice; or has no typical hanging tributary valley; or is a V-shaped young gorge with narrow bottom. Similarly, the discussion of hanging valleys given by the same author on an earlier page (271) is unconvincing, inasmuch as the hanging valleys cited are very short, or have partially graded their lower courses; and all are tributary to a main stream which occupies a narrow-bottomed V gorge of pronounced gradient. They

* Concluded from p. 837, November *Bulletin*, 1911.

are in no sense comparable with the hanging valleys tributary to wide open valleys, such as the Yosemite, which appear to afford strong evidence in favor of glacial erosion.

Instead of disproving the glacial origin of the Yosemite, the comparison of valleys suggested by Turner really affords strong evidence in favor of the theory of glacial erosion. It is no mere coincidence that of the six valleys named by that writer the two most unlike the Yosemite have presumably suffered little or no glaciation, whereas the four most like the Yosemite served as the outlets of extensive glacial basins. The areas of these basins may be determined roughly by drawing boundaries which shall enclose all of the strongly glaciated region tributary to the several valleys. Although this does not take account of the passage of ice from one basin to another across the present divides, the method is sufficiently accurate, when applied to alpine regions of strong relief, to enable one to discriminate between profoundly and slightly glaciated basins, and between basins which favor extensive erosion of the master valley, and those which do not.

The valley near Sugar Loaf, on the South Fork of the American River, is so little like the Yosemite that the contour map leaves one in doubt as to why they should be compared; for the contours represent a V-shaped gorge without hanging valleys, although a few of the tributaries have their lower courses somewhat over-steepened. The basis of comparison with Sawmill Canyon is simply that the latter "under favorable circumstances would widen out into a Yosemite"; but since this questionable statement involves the very point at issue, the comparison is not permissible. On the other hand, the small valley on the Middle Fork of Stanislaus River at the mouth of Niagara Creek bears some resemblance to the Yosemite by reason of its steep walls and flat floor; but the contour map shows such marked evidences of glaciation in the headwater portions of streams draining into this valley that it seems quite probable that a glacier traversed the valley and gave to it its peculiar form. The area of the glacial basin is smaller in this case than in the others mentioned below, and this may account for the small size of the glacial trough on the Middle Stanislaus. Hetch Hetchy Valley is truly another Yosemite, larger than the valley on the Middle Stanislaus, because it is the outlet of a larger and more profoundly glaciated basin. It is smaller than the real Yosemite, because its glacial basin, while very large, is very asymmetrical (Fig. 3 a). The ice streams, instead of flowing comparatively short distances to the center of the basin and there uniting to form a large and powerful glacier, as in

the case of the Yosemite Valley (Fig. 3 b), were compelled to flow almost clear across the basin before reaching the master valley, which they joined at various points along its course, instead of concentrating at one point. It should be remembered, also, that part of the ice of the Hetch Hetchy basin crossed the divide into the

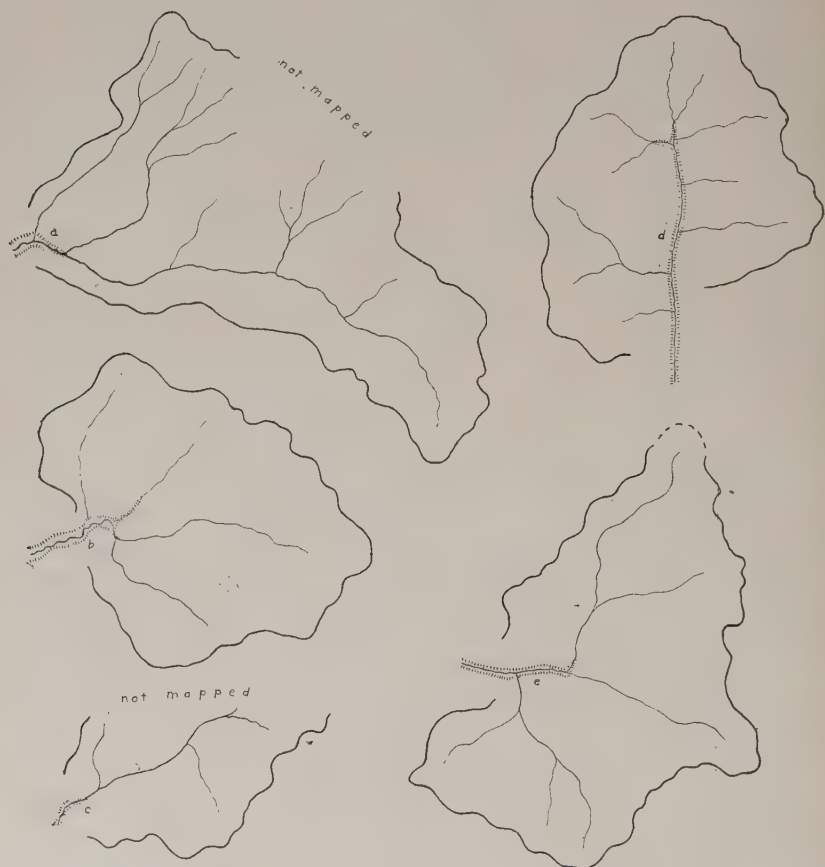


FIG. 3.—Sketch maps showing relation of the Yosemite and other similar valleys to their glacial drainage basins. Stream lines indicate general direction of glacial drainage. Based on U. S. Topographic sheets. No account is taken of ice entering basins from beyond present divides. *a*, Hetch Hetchy Valley; *b*, Yosemite Valley; *c*, Tehipite Valley; *d*, Kern Cañon; *e*, Grand Cañon of Kings River.

Yosemite basin; but I believe the shape of the area draining into the Hetch Hetchy is the more important factor in determining the less profound glaciation of that valley.

Tehipite Valley is likewise the outlet of a basin (Fig. 3 c) in which glaciation was evidently very pronounced. While the glacial

trough form is marked, this valley is less striking than the Yosemite, presumably because its glaciated basin is less symmetrical and permitted less concentration of the ice streams than was the case with its more fortunate neighbor. The Grand Canyon of Kings River, the last of the valleys mentioned by Turner, is the outlet of a splendid glacial basin (Fig. 3 e); consequently it is itself a splendid glacial trough. One might add to the above list Kern Canyon, which has the trough form well developed, because it is the outlet of a basin (Fig. 3 d) in which glaciation was profound, and is so shaped as to admit of a fair concentration of ice streams. Yosemite Valley owes its preëminence to the favorable combination of several elements: (1) a remarkably symmetrical basin, which was (2) profoundly glaciated, and which permitted (3) intense concentration of ice streams, one of which was augmented by (4) overflow ice from a neighboring basin. Variations in the country rock doubtless played their part in giving to the different troughs different degrees of perfection; but I regard rock differences as of less importance than differences in the size, shape, and extent of glaciation, of the basin for which the troughs serve as outlets.

Turner has suggested (p. 318) that the Yosemite Valley may have acquired a depth of 1,000 feet by the beginning of the Pleistocene, and that this "lessens the difficulty of accounting for the present depth of the Yosemite and of other canyons of the southern Sierra." The elevation of the Merced River previous to glacial overdeepening was, as shown above, from 2,000 to 2,500 feet above the present level of the stream, or between 6,000 and 6,500 above present sea level. This may have been 1,000 feet below the higher parts of the imperfectly developed peneplain. In any case, the present hanging valleys appear to have been graded with reference to that elevation of the Merced, and the indications are that the Merced at that time occupied an open valley as did the tributaries. The difficulty which confronts the theory of stream erosion of the Yosemite is not the absolute depth of the canyon, but rather the relation of the broad-floored main valley to the hanging valleys. This difficulty is not lessened by imagining an earlier or later date for the initiation of canyon cutting.

The character of Tenaya Canyon has always been a serious difficulty in interpreting the Yosemite as a stream carved valley. Tenaya Creek, with a drainage area little if any larger than that of Yosemite Creek, flows through a wide open valley to an accordant junction with the aggraded floor of the open Yosemite Valley, instead of dropping 2,000 feet or more from a hanging valley. Assuming nor-

mal stream erosion, it is hard to see why one small tributary should be able to reduce its valley to grade and to open out its valley floor to a considerable width, while a similar tributary near by has made but a small beginning on so vast a work. Mr. Theodore Solomons has suggested that the Lyell Fork of the Tuolumne and its branches were formerly headwaters of Tenaya Creek, but have been captured by the Tuolumne River. This would account for a formerly larger volume of Tenaya Creek, under which condition the cutting of the canyon would seem less remarkable. Turner (276-277) discusses this possibility, but on the evidence of river gravels dismisses it as "very improbable." Even if we suppose that the Lyell Fork drainage formerly came through Tenaya Canyon, we still encounter difficulties in explaining the relation of the canyon to the hanging valleys. On the other hand, if we accept the very reasonable hypothesis that during the glacial period much ice from the Tuolumne Valley crossed the low divide into the Tenaya Basin, and thus agree with Turner (305-306) and Gannett (87) that the Tenaya Glacier was the largest ice stream which entered the Yosemite Valley, we have, on the theory of glacial erosion, an adequate explanation for all the features observed. The Tenaya Canyon owes its U-shaped cross-profile, and its depth below the hanging valleys to glacial erosion. The canyon is deeper and more imposing than other valleys tributary to the Yosemite, because it was carved by the most powerful tributary glacier. The small Tenaya Creek is even much deeper than corresponding portions of the main Merced River in the Little Yosemite Valley, because the Tenaya Glacier was larger and more powerful than the Little Yosemite Glacier.

THE LONGITUDINAL PROFILE OF THE MERCED RIVER

Reference has been made above to the fact that some of the streams entering the Merced west of El Portal, as, for example, Bear Creek and the North Fork of the Merced, have over-steepened lower courses. They join the Merced with accordant junctions, but a short distance back from the main river show an increase in gradient, while their upper courses are again of gentle slope. One should not be surprised to find a comparable feature in the main river itself, farther up stream. For while an even tilting would initially increase the gradient of the main river uniformly throughout its course, greater volume would allow the lower course to intrench itself more rapidly. If to difference in volume we add difference in rock resistance, it is easy to see how one part of the stream flowing in weaker

rock might intrench itself more rapidly than a part up stream on more resistant rock, thus developing a locally steep gradient which would gradually retreat up stream. Something of this nature is shown in the longitudinal profile above (east of) El Portal. It should be remembered that, west of El Portal, the valley of the Merced is unglaciated, while east of the western end of the Yosemite, the valley has been profoundly glaciated. Between these two points, El Portal and the western end of the Yosemite, the valley has been traversed by glaciers to some extent, and shows the effects of glacial erosion very distinctly near the Yosemite, but to a decreasing extent toward El Portal. Had the pre-glacial Merced possessed a well-graded profile in this region, we should expect to find now, as a consequence of glacial erosion, a gradual decrease in gradient above El Portal, until the gradient finally became approximately flat, or even reversed, in the Yosemite Valley, where glaciation was most profound. Instead, we find a very pronounced steepening of the gradient above El Portal, similar to the steepening observed in the lower courses of the non-glaciated tributary streams farther west. It is evident that before glaciation the main river had not completely graded its course, although it had pushed the over-steepened zone as far up stream as El Portal. From this point the profile rose rapidly to a level some 2,000 feet above the main portion of the Yosemite Valley, as shown by the position of the hanging valleys. The western part of the Merced was then entrenched, the eastern part still flowing on the uplands. Glacial erosion has greatly altered the profile of the eastern part, but some trace of the pre-glacial conditions persists in the over-steepened profile east of El Portal.

VALLEY WIDENING IN¹ JOINTED ROCKS

One of the most evident relations in the present topography of the Yosemite Valley is the control of joint planes upon weathering and erosion. Impressed by the remarkable form of the Yosemite Valley as a whole and by the important influence of jointing upon the form of the valley walls, some observers have genetically connected the two, seeking to explain the former by the latter. Unfortunately, no one who supports this view has set forth in detail just how stream erosion on jointed rocks can develop valleys essentially different from those developed by stream erosion on unjointed rocks. A brief analysis of this phase of the Yosemite problem may not be amiss. Let us first consider the process of valley development in massive, unjointed rocks.

If a main stream incises itself with such rapidity that the walls weather back but slightly before a deep trench is cut, the stream will come to flow in a narrow chasm with more or less nearly vertical walls. The width of such a chasm is little if any greater than the width of the stream. Tributaries may entrench themselves more slowly, and so give rise to lateral hanging valleys. If we imagine weathering to proceed more rapidly, the walls of this valley will retreat as the stream cuts downward. Two factors operate to make the higher portions of the walls retreat farther than the lower portions. First, the higher portions are exposed to the influence of the weather for a longer time. Second, a greater transverse breadth of rock is in unstable equilibrium near the top of a narrow chasm than near the bottom. Just at the stream level no rock is in an unstable position, and weathering must proceed very slowly where gravity has little or no chance to remove the rock fragments. Hence, valley widening due to weathering is at a minimum at stream level. A little above the stream level a narrow segment of rock on each side is liable to fall down into the stream as fast as its parts are loosened by weathering. Here the valley may be widened slightly, due to weathering alone. The corresponding segment of rock which is liable to weather from still higher levels is much greater; so that the top of a valley may weather to a width of a mile or more while the bottom remains the width of the stream itself.

The above is perhaps an over elaborate statement of the well recognized relation between stream incision and weathering which results in the V-shaped cross-profile of most young stream valleys. It should not be inferred that the young stream does no lateral cutting while entrenching itself, for lateral erosion lends its aid to weathering in producing the width of the valley. But during the youth of a stream, when down-cutting is active, the effect of lateral cutting is ordinarily obscured by the far greater work of weathering. It is fair to say that during youth, valley deepening is largely due to stream cutting, valley widening largely due to weathering; whence it follows that a young stream cannot develop a broad, flat valley floor. Beginning with maturity, valley deepening becomes of small importance, and valley widening may be due more to lateral cutting than to weathering. A flat valley floor, many times the width of the stream, may be developed.

Let us now consider whether the above principles are modified in case the valley walls are intersected by joint planes. In order that joint planes may produce the greatest effect upon erosion forms, they must be neither too widely nor too closely spaced. If too widely

spaced, much of the valley will be carved in massive, unjointed rocks. If too closely spaced, the rock mass will be so badly broken up as to constitute an area of relatively non-resistant material of fairly uniform character; and only minor features of form will show the effect of joint control. Let us imagine, then, a region of massive rock, such as granite, traversed in several directions by joint planes of such frequency as to make the included joint blocks of large, but not excessive size. The process of weathering will certainly be facilitated by the jointing; but it does not appear that this structure can produce any essential modification of the ultimate result. Joint planes sloping toward the stream will allow weathering and gravity, to remove the granite blocks which are in an unstable position more quickly than would weathering in unjointed granite. The open V-shaped cross-profile will be the more quickly attained. But the large joint blocks at stream level are in a stable position, and no process of normal weathering is known which would pry them out of so secure a place against the pull of gravity, in order to widen the bottom of the V. They cannot be washed away by the stream itself. Whether massive or broken by joint planes, the rocks in the bottom of a gorge must wear away little by little, even though great joint blocks may fall from unstable positions high up on the valley walls. This holds true, no matter what varieties of jointing we imagine to exist. Vertical joints will leave temporary, vertical faces wherever a joint block falls from place. A vertical face is unstable, however, and must slowly weather back to a more gentle slope. If a stream quickly incises itself in vertically jointed rocks, we may have a narrow chasm with vertical walls. But as soon as weathering makes its effects apparent, we must have a markedly greater width at the top of the gorge than at the bottom, the latter remaining narrow so long as the stream is youthful.

Returning to the case of the Yosemite Valley, we observe an undoubted characteristic of youth in the hanging valleys. Yet the width of the main valley cannot be largely due to weathering, since the valley floor is broad and flat. Joint planes, such as would facilitate weathering, are present in the valley walls, and are evidently influencing the weathering now in process. But no process of weathering in jointed rocks can account for the great width of the valley floor. The hanging valleys confirm the conclusion that the width of the Yosemite is not due to weathering; for stream courses descending a valley wall are worn back, by erosion and weathering combined, at a faster rate than are the interstream areas where weathering alone is active. If the walls of the Yosemite had retreated by weathering, the

tributary streams, and especially the larger ones, should have cut so far back from the main valley as to have destroyed the hanging valley effect. Instead, we find the tributaries cascading down the main valley walls, or descending in slight re-entrants formed by the rapid breaking away of joint blocks which occupied unstable positions in the steep valley walls.

One can conceive that valley widening in jointed rocks due to lateral cutting by a shifting stream of early mature age might give a flat-floored, steep-walled valley; for when down-cutting is reduced to a comparatively negligible quantity, lateral cutting at approximately one level will widen the valley floor by undermining the valley walls. Granted the favorable combination of a graded, shifting stream eroding laterally with vigor, and rock walls which weather slowly in comparison with the rate of undercutting and which are traversed by vertical planes of weakness, we can imagine the removal of the valley walls to take place in such a manner as to leave vertical faces on the retreating cliffs.

That the broad floor and steep walls of the Yosemite Valley cannot have this origin is evident from the existence of the hanging valleys. The latter would have been reduced to grade before the Merced River could have accomplished so great a work as the grading of its course and the undermining of its walls by lateral cutting. The existence on the same stream of hanging valleys, a characteristic of young streams, and an open valley floor, a characteristic of mature streams, demands a special explanation.

There is a special set of conditions which may possibly constitute an exception to the above statement. If a stream follows a belt of very weak rock, between masses of very resistant rock, and an uplift permits rapid entrenching, the stream may have time to broaden its valley floor in the weak rock before the tributaries, held up on the hard rock, advance far in the process of grading their courses. That the combination of favorable circumstances necessary for the production of hanging valleys of this type is exceedingly rare, is evident from their almost complete absence in regions of normal stream erosion, even where alternate belts of resistant and non-resistant rock exist. There is no evidence that any strong contrast in rock resistance existed between the granite removed to form the Yosemite Valley and the granite which remains in the valley walls. Jointing will not explain the phenomena unless we imagine a zone of granite so badly jointed and crushed as to give a belt of weak material of the width and pattern of the Yosemite Valley, all of which has been quickly removed, leaving granite of markedly different character in

the present walls. A far more reasonable hypothesis is to regard the Yosemite Valley as one of the many open main valleys with hanging tributaries which characterize every region of Alpine glaciation, and which are reasonably interpreted as the product of glacial over-deepening of pre-existing river valleys.

It may be pointed out that the remarkable effects of jointing observed in the walls of the Yosemite are indirectly due to glacial over-deepening and over-steepening. Not until glacial erosion had made the steep-sided trough, was full opportunity given for the joint blocks to fall from place leaving the angular re-entrants and vertical faces which form such an important element in Yosemite scenery. Weathering and gravity have worked to great advantage in the recent past, and the resultant features are bold and striking. In the future, as the walls wear back to more gentle slopes and the more stable position of the joint blocks causes them to waste gradually away instead of falling in large masses from the cliffs, the valley walls will become cloaked with debris, the bold features of today will give place to more flowing, graded profiles, and the grandeur of Cathedral Rocks, Three Brothers and Half Dome will be a thing of the past. The influence of jointing on weathering is thus to be interpreted as an indirect effect of the glacial origin of the valley, rather than as an important agent in the formation of the valley.

THE NOTCHES BESIDE THE FALLS

As an observer stands in the Yosemite Valley and views the cataract of the Yosemite, Lower Yosemite, Illilouette, Vernal or Nevada Falls, he notes that beside each fall is a deep notch which the stream curiously avoids, to fall over a sheer cliff, as if to provide for man the most stupendous spectacle possible. Branner has given us a good description of this peculiar topographic feature (547-553), and has attributed the formation of the notches to the action of the several streams during a time when they were displaced from their normal positions by ice. A glacier occupied the bottom of each valley, forcing the stream to take a course some distance to one side, where it was held between the ice and the valley wall. While in this position the notch was cut. When the glacier disappeared the stream returned to its former position, leaving the notch deserted. Inasmuch as the stream cut the notch back faster than the glacier eroded its channel, it was argued that glaciers must have very little eroding power, and that the Yosemite Valley must therefore be the result of normal stream erosion in jointed rocks.

The present visitor to the Yosemite may profit by Matthes's excellent topographic map, which was not available when Branner wrote his account of the notches. An inspection of the map, suggests the necessity of some modification of this author's interpretation, and the field evidence confirms the suggestion. The notches beside Lower Yosemite Falls, Illilouette Falls, and Vernal Falls do open up at a higher level in the floors of the valleys in which they were cut, as required by Branner's theory. But above these notches are no signs of abandoned stream channels, and in the notches are no signs of stream erosion. On the other hand, the notches are seen to result from the normal weathering away of granite along oblique joint planes. When

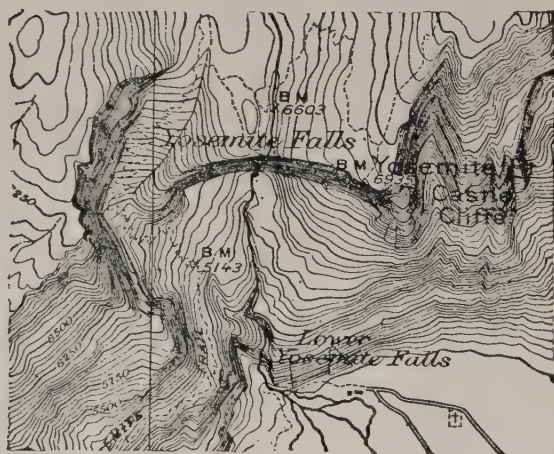


FIG. 4—Yosemite Falls. Showing abandoned stream-carved notch to the west, through which the trail passes. West of the Lower Yosemite Falls is a notch due to weathering along joint planes.

we remember that over-deepening of the main valley left the steep valley walls (and likewise the rock steps in the main valley) in an unstable condition, it is easy to realize how the granite would break down rapidly wherever cut into blocks by jointing; and how successive blocks breaking from the lips of hanging valleys would leave oblique scarps in case principal joint planes intersected the axes of the valleys at oblique angles. An oblique scarp meeting the valley wall on one side of the stream would give such a notch as we find at each of the three falls in question. The notches at Vernal Falls (Fig. 6) and Lower Yosemite Falls (Fig. 4) are developed on NW-SE joints belonging to the same system as the joint which gives form to the southwest face of Mt. Broderick and Liberty Cap. The notch at Illilouette Falls (Fig. 5) is due to a NE-SW joint plane, similar in direction to those which appear at Nevada Falls and on the steep face of Half Dome.

The notch at Nevada Falls (Fig. 6) is undoubtedly a stream carved notch, but it does not open on the side of the valley wall as represented in Branner's sketch map. Indeed, it opens so squarely in the

bottom of the valley above the falls that a small part of the water of the Merced River escapes through the notch, diminishing the volume of the falls by so much. The size and form of the notch, and the large water-worn boulders found in it, indicate that the entire river passed through it at one time. It does not seem necessary to invoke glacial displacement to get the stream in the notch, since part of the stream flows naturally into it even now. A simpler interpretation is that the notch was cut in the bottom of the valley under normal conditions, and that a slight displacement, possibly a glacial advance, turned the stream into its present course over the cliff.

The notch beside the Upper Yosemite Falls is similar in origin to that beside the Nevada Falls. Yosemite Creek formerly flowed through the notch, but was shifted to its present position, doubtless by a late advance of the Yosemite Creek Glacier. It would seem that Yosemite Creek acquired its abnormal position earlier than did the Merced River at Nevada Falls, since the creek has had time to entrench itself to a noticeable extent, although the probable former course of the creek may still be observed in the depression above the notch which is followed by the trail for some distance.

The existence of two distinct types of notches beside the falls in the Yosemite region is clearly shown by Matthes's map, from which the above figures are reproduced. In fact, my first appreciation of their dual character came from a study of the map. After this paper had been prepared for presentation at the geological meetings in Boston during the last convocation week, I learned that Matthes recognized the dual character of the notches during his field work.

Returning to the question as to what evidence the notches offer concerning the relative efficiency of stream and glacial erosion, it should be noted that the notches at Lower Yosemite Falls, Illilouette Falls and Vernal Falls afford no evidence on this question since they were formed independently of stream erosion. The notches at Upper Yosemite Falls and Nevada Falls were carved by stream erosion after the main valley had been over-deepened, and before the

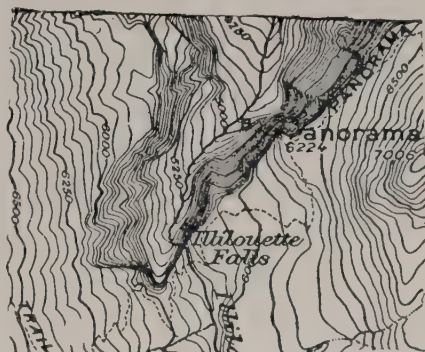


FIG. 5—Illilouette Falls. Showing notch due to weathering along joint planes.

ice advance which displaced the streams to their present positions. According to the theory of glacial erosion the main valley was over-deepened by ice action. Hence the notches are of inter-glacial age—
younger than (part of) the glacial deepening of the main valley, and older than the glacial displacement of the streams to their present courses.

Post-glacial cutting has formed only insignificant notches where the streams now pass over the ledges. Making no allowances for



FIG. 6—Vernal Falls and Nevada Falls. Just south of Vernal Falls is a notch due to weathering along joint planes, while north of Nevada Falls is a notch carved by the stream. Trails pass through both of these notches.

difference in volume and load of streams in inter-glacial time, it would appear from the relative sizes of the notches that post-glacial time has been short as compared with inter-glacial time. On this interpretation the notches afford no evidence one way or the other as to the efficiency of glacial erosion.

CONCLUSION

The Yosemite Valley is a young glacial trough of great depth, whose walls of jointed granite are in a youthful stage of weathering, and whose floor has been maturely aggraded by the main stream. The position of the trough was determined by a preëxisting river valley which guided the advancing glacier. Extensive glacial erosion was favored by the shape of the glacial drainage basin, which permitted different ice streams to converge at one point and form the

unusually vigorous Yosemite Glacier. Glacial over-deepening exceeded 2,000 feet in the Yosemite region, and produced the remarkable hanging valleys for which the region is famous. Glacial over-steepening produced the steep valley walls, and made possible the effective weathering along joint planes, to which the details of cliff sculpture are due. Many of the notches in the lips of the hanging valleys are due to the joint-controlled weathering; but some are stream carved notches, deserted by their streams because of glacial interference. Both types of notches are expectable features in the side of a glacial trough located in jointed rocks.

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THE ERUPTION OF TAAL VOLCANO

The following account of the eruption of Taal Volcano on January 30, 1911 is abridged from a paper prepared by Mr. Walter E. Pratt.*

Taal Volcano, in southwestern Luzon, "began throwing out steam and mud on January 27, and continued in eruption with increasing violence during January 28 and 29, culminating in an explosive out-

* *The Philippine Journal of Science*, Vol. VI, 1911, No. 2, pp. 63-83. 3 figs. in text and 14 plates of photo-engravings and maps.

burst early on the morning of January 30, which laid waste the surrounding country over an area of 230 kilometers, killing practically all life within this area. Mud or ashes spread over more than 2,000 square kilometers in southwestern Luzon. The activity diminished gradually to a state of normal quiescence by February 6 to 8."

Mr. Pratt's paper "embodies personal notes made during the two weeks immediately succeeding the eruption. In this time every part of the devastated region was visited. Information as to what happened on the night of the eruption was secured by conversations with people who had witnessed it at close range from different points of view. On January 30, the writer went to Bañadero, a town near the volcano, and during a large part of the subsequent field work Mr. Charles Martin, photographer of the Bureau of Science, was with him. Mr. Martin also was on Volcano Island just before the main eruption. . .

"Taal Volcano near the center of Lake Bombon may be said to constitute an island with the active crater centrally located on it. Its rim is low, varying from 100 to 320 meters in elevation. Its floor stood just above sea level prior to this last eruption. The volcano is about 60 kilometers south of Manila. The crater has an area of about 3 square kilometers, the island contains about 25 square kilometers, and Lake Bombon covers an area of approximately 320 square kilometers. Each is roughly oval in general outline. There were seven small *barrios* (villages) on the island and Lake Bombon was fringed with the homes of native fishermen and sugar-cane planters. . .

"There is no evidence that lava ever flowed from Taal Volcano. The crater walls, the island, and the whole surrounding country are composed of bedded volcanic tuff and agglomerates. Volcano Island contains a number of small extinct craters or cinder cones and it is generally conceded that volcanic activity formerly covered the whole area of the present lake, either as a single great crater or more probably, perhaps, as a large number of smaller craters. For a concise discussion of Taal Volcano, its geology and historic eruptions, the reader is referred to the work of Dr. George I. Adams.*

"The first intimation of the approach of the eruption was obtained from the increased size of the cloud of steam which always hangs over the active crater, and also from mild earthquakes. People as far away as Batangas (about 30 kilometers distant) began to be alarmed by these conditions on Friday, January 27. The earth-

* Geological Reconnaissance of Southwestern Luzon. *Philipp. Journ. of Sci.* Sec. A (1910) 5, 57.

quakes increased rapidly in violence and number and, on the following day, the immense white cloud, plainly visible from Batangas, was frequently blackened by the ejection of mud. The cloud rose in explosive outbursts, which were often immediately preceded by a perceptible earthquake shock. A noticeable amount of mud had already fallen on the slopes of the volcano when Mr. Martin reached the island on Sunday morning, January 29. At about 3.30 Sunday afternoon large cracks opened in the earth near the towns of Lemery



FIG. 1.—Map of a part of Southwestern Luzon showing area covered by mud from the eruption.

and Taal. Probably also the small fissure at Talisay appeared at this time. There were fewer earthquakes recorded on Sunday than on the previous day, although severe shocks accompanied the appearance of the earth fissures. Apparently, the activity of the volcano was slightly lessened on Sunday afternoon. On Sunday evening the activity began to increase again about dark with violent outbursts from the volcano and sharp earthquakes. About 11 P.M. a very severe earthquake was followed closely by the ejection of a massive

black cloud from the volcano. From this time on, it appears, the cloud above the volcano was very frequently crossed and streaked with lightning, and often showed flashes or sheets of light. Some people saw incandescent bodies rising out of the crater and falling in graceful curves to the earth. At 1 o'clock in the morning, another outburst occurred, probably more violent than the one at 11 o'clock, but similar to it. At 2.20 o'clock in the morning, without any severe earthquake, but accompanied by a loud noise, resembling an explosion, the culminating outburst of the eruption took place. The great black cloud shot up higher than before and finally spread out at the top like an umbrella, or a giant cauliflower. The lightning became much more intense, there was much explosive noise and at some places, such as Talisay and San Nicolas, a strong wind came from the volcano. At Bañadero there was little wind, but mud began to fall. Very soon the lake suddenly rose about 2.5 meters. The mud at Bañadero was cool and fell like rain. The activity decreased gradually, and by daylight the cloud from the volcano was again white.

"This main eruption awakened many people in Manila, and in Dagupan, 240 kilometers north of the volcano, people say they were awakened at about this time by hearing a noise. The effect in Manila was that of a tremendous vibration, accompanied by the rattling of windows and loose doors. The noise seemed to pass over the city in a great wave, so that it was heard farther away, after it had ceased close at hand. No earthquake was recorded in Manila at this time."

"The eruption cloud, which rose over the volcano, emerged from the crater with explosive violence, rose rapidly to a great height and finally spread out at the top in a horizontal layer. It is doubtful if its burden of solid ejecta reached a greater height than 3,500 meters. A feature of the movement of this explosive cloud was its terrific sweep downward and outward from the crater rim. The evidence of this movement is obtained from its effect on the vegetation on the lower slopes of the volcano and the west shore of Lake Bombon. The heavy growth of cogon grass was flattened absolutely and patches of forest except where protected by the topography were completely destroyed though not burned. Broken ends of tree stumps and branches were literally shredded as though exposed to the action of a powerful sand blast. Outside the central area over which this explosive expansion of the gases was felt the eruption caused only a rain of mud which fell gently.

"This downward and outward movement is difficult of conception

to those who saw the steadily rising cloud above the volcano during the activity. However, when it is recalled that explosions tend to act equally in all directions, downward as well as upward, and when it is remembered that the air above the crater was already heavy with condensing steam and falling mud when the main explosion occurred, it is apparent that expansion would naturally take place in the manner described. . . It is probable that at a greater distance from the crater than was attained by this outward expansion, the atmosphere moved toward the volcano, as a center of low pressure resulting from the upward rush of the cloud. Such a movement is evidenced by the sudden falling of barometers around the volcano. In Manila, an otherwise regular barograph at the Weather Bureau Observatory shows a sharp drop of 1 millimeter at the moment of the eruption. At Batangas a similar drop amounted to 2 millimeters. At both these places there was a slight wind toward the volcano after the eruption. . .

"For an hour or more during the greatest activity the cloud above the volcano was vivid with lightning which played in streaks, often branched or forked, and ran either up or down or obliquely over the cloud. . . Spectacular electric displays have been prominent features of many volcanic eruptions. Special descriptive names have been applied to this particular type of lightning.* Its origin has been ascribed to the generation of electricity by the intense friction occurring between the individual ash particles in the moving cloud.† Probably friction between ash particles and the air or friction of the vapor-laden gases of the rising cloud with the surrounding drier atmosphere, are contributing causes.

"The earthquakes ‡ accompanying this activity of Taal are tabulated in chronological order in a report "The Eruption of Taal Volcano, January 30, 1911" written by Father Miguel Saderra Masó, Assistant Director of the Weather Bureau. Father Masó concludes that the earth-movements were very local, that they emanated from the immediate vicinity of the volcano and that they lost intensity very rapidly as they traveled away from that center. The most violent earthquakes recorded in Manila were of intensity IV of the earthquake scale of De Rossi Forel § and Father Masó thinks it probable that even in the vicinity of the volcano no shock occurred more intense than VII. || Consequently, a shock of intensity III at

* Hovey, E. O., Martinique and St. Vincent, *Bull. Am. Mus. Nat. Hist.* (1902), 16, 333.

† Scrope, G. P., *Volcanoes*, London, 2 ed. (1862), 57.

‡ The earthquakes in connection with the eruption of Taal will be the subject of a special bulletin of the Philippine Islands Weather Bureau.

§ Strong enough to shake movable objects, chairs, and windows, etc.

|| Strong enough to overturn movable objects, shake off plastering, etc.



FIG. 2—Eruption cloud as it appeared from Bañadero, January 30, 1911.

the volcano might not be felt in Manila at all. It is beyond question that a great many more shocks really did occur near the volcano than were recorded in Manila. The local extent of the earthquake shocks suggests that the center of Taal's activity was not at a great depth. . .

"Damage due directly to earthquakes was slight. The towns of Taal and Lemery were most shaken. In Lemery the tower of the Casaysay Church was partly demolished. Masonry gateposts in the wall which surrounds the church were overturned and fell to the west. This church is directly in the line of one of the fissures and some of the damage is evidently due to the vertical displacement along it as the west side dropped. . . Numerous small landslides occurred in the steeply eroded hills of volcanic tuff to the west of Lake Bombon. The shocks cracked and displaced several old masonry walls in Talisay.

"Lake Bombon rose suddenly just after the main eruption. This wave (or series of waves close together) washed up on the lake shore through a vertical distance of 2.5 or 3 meters carrying away houses and causing loss of life in some of the *barrios*. If, as seems established, no severe earthquake occurred for some time before this wave was observed, its cause must be sought in another direction. The whole of Volcano Island sank from 1 to 3 meters. . . It is probable, on the whole, that the island sank gradually, causing only minor earthquakes and very slight disturbance to the lake surface. The explosive rush of gases down the volcano slopes affords a possible explanation of the water wave. This blast, the strength of which is intimated by the absolute destruction it wrought, moved with a considerable downward component (tending to expand equally in all directions) until the moment it reached the lake level. Responding to this downward pressure, the lake surface would be depressed, and its reaction would cause a wave or waves. Thus, the water would have literally been blown away from the volcano to the lake shores.*

"The known ejecta from Taal in this eruption were (1) steam (probably water also), (2) sulphur dioxide, (3) angular pieces of homogeneous extrusive rock, (4) fragmental blocks of volcanic tuffs and agglomerates, and (5) volcanic mud or ash. Steam made up

* It is difficult to estimate the velocity of expansion of the eruption cloud at the time it reached the lake level. Generally accessible data show that a wind velocity of 100 miles (160 kilometers) per hour is sufficient to uproot large trees. Large trees were uprooted 2 kilometers inland from the west lakeshore. Since the velocity must have decreased very rapidly as the expansion progressed, it may have been as high as 200 miles (320 kilometers) per hour at the foot of the volcano. Wind moving with this velocity would exert a pressure of 200 pounds (Trautwine, John C., London, 17 ed. (1900), 321) per square foot (4 kilograms per square centimeter), sufficient actually to support a column of water 1 meter high. This estimate does not take into account the considerable inertia of the dense load of mud or ash which traveled with the wind, and which would increase its effect.

practically the whole volume of the gases. The odor of sulphur dioxide was strong during the eruption and probably this gas or its oxidation product was effective in killing vegetation.* Other gases, notably carbon dioxide, may have been present in the cloud. There was apparently no odor of hydrogen sulphide and there is no evidence of the presence of other inflammable gases.

"The angular boulders thrown out ranged up to perhaps 300 kilograms in weight. The large rocks fell on the upper slopes of the volcano near the crater's rim. Andesitic specimens and others of basaltic character, neither with any appearance of recent fusion, were noted. . . . The blocks of tuff thrown out are identical in appearance with the bedded material of the crater walls. Some of the fragments weigh perhaps 200 kilograms. Other large pieces had broken from the impact of their fall. Bedding planes could be distinguished in many fragments. . .

"Fig. 1 shows the distribution of solid ejecta from Taal. Three roughly concentric areas have been outlined. The smallest one, 230 square kilometers, includes the devastated region where man and large animals were killed by the direct action of the volcano. It also limits approximately the area over which the fall of mud or ash exceeded 10 centimeters in average thickness. The next larger area is approximately that over which the average thickness of the fall of mud exceeded 1 centimeter. Over the largest area, 1,940 square kilometers, the mud formed a noticeable continuous coating, more than 1 millimeter (approximately) in thickness; beyond this limit it was only visible by close observation.†

"The greatest fall of material within the devastated area was on the west slope of the volcano. The maximum thickness of two meters noted here occurred where the ash and small fragments had drifted into an old water course. However, the ridges adjacent were all but bare, and therefore an estimate of 20 to 30 centimeters for the

* At Bañadero, where cool mud fell without violence to the depth of 1 centimeter, the leaves of the trees retained only a thin coating on their upper surfaces, yet within twelve hours many leaves and some fruit, such as oranges and wild fruits, had fallen, suggesting an effect of poisoning from the mud. Ultimately, all leaves and fruit in this section died. In several instances clothing, such as brown flannel shirts, white towels, etc., on which mud fell at Bañadero, was stained yellow. In San Pablo the fall of mud was very light, "like sugar sprinkled over a cake," yet garden plants were killed by it according to Mr. W. E. Crowe, supervising teacher.

† Comparing these areas to similar areas from the eruption of Mont Pelé in May, 1902 (see Hovey, E. O., *Am. Jour. Sci.* (1902), 14, 320), it develops that Taal devastated more than twice the area that Mont Pelé did, although the eruption was probably of much lesser magnitude. The ashes from Pelé spread over an area probably ten times as great as those from Taal. The crater of Mont Pelé is 1,280 meters above sea level, while Taal in places is as low as 100 meters. Thus the eruption from Mont Pelé had much more room for downward expansion, and the same energy at the crater threw its ejecta much higher in the air than in the case of Taal.

average maximum depth of fall for this vicinity is probably reasonable. . .

"The system of fissures which formed during this eruption is significant of the relation of Taal Volcano to the general structure of the region. This subject has been one of considerable interest to geologists who have studied this area. Centeno* placed Taal on an approximately north and south line with Mount Arayat in the central valley of Luzon north of Manila. Adams† thinks it probable that Mount Arayat is on the same structural line as Taal and argues that the general trend of structure in southwestern Luzon is to the north-



FIG. 3—Fissure in town of Lemery. Looking east.

west. However, he suggests the possibility of a line through Balayan Bay, Taal Volcano, and Laguna de Bay, and sees a possible elevated fault-block in the high ridge north of Lake Bombon and west of such a line.

"The trend of the recent fissuring indicates a line of weakness passing through Taal Volcano and bearing about N. 30° E. This trend extended beyond the limits of the system and runs closely parallel to the east coast of Luzon and the length of Palawan, passing through Laguna de Bay and Balayan Bay. The earthquakes

* *Estudio Geológico del volcan Taal*, Madrid. Tello (1885).

† *Philippine Jour. of Sci.* Sec. A (1910), 5, 101.

were strongest in Taal and Talisay, along this line. The alignment of craters on Volcano Island conforms well with such a trend as do also the outline features of both island and lake. No recent fissure could be traced across the island itself, a fact scarcely explained by the greater fall of ash. If the fissures noted owe their trend entirely to movement radial from the crater their location is still significant, since careful search discovered no other radial fissures around the lake. The fissures are vertical, remarkably regular, and show only a vertical (no lateral) displacement. Where the displacement exceeds about 20 centimeters there is a sharp break and resulting scarp, otherwise only a gentle roll along the line of trend is evident. Generally speaking, the maximum displacement is along the central portion of the fissure, decreasing gradually to each end. It should be noted that displacement did not take place completely at the time the fissures appeared. It increased perceptibly for several days, during which earthquakes were frequent, after the opening of the fissures.

"The two most prominent fissures occur along the bases of the walls of bedded tuff which form the main terraces of the Pancipit River Valley. Their vertical displacements vary up to about 3 meters, and their scarps face each other across the valley. The intermediate fissures have displacements not exceeding 1.5 meters (averaging about 0.8 meter). The whole system bears an evident relation to the existing structure. The intermediate fissures occur on relatively high ground, around which the Pancipit River makes a wide detour to the west. The ground surface slopes to the east, the strata (tuff) dip slightly to the east and the fissure scarps generally face the east. In the town of Lemery, a minor fissure leaves the general trend of the system to follow the contact between the tuff and recent alluvial for a short distance.

"There is a noticeable tendency to maintain the displacement along the trend of the system by alternate parallel fissures. One fissure begins where another ends; thus the system presents a staggered arrangement.*

"Along the main fissure in the town of Lemery the displacement was accomplished by dropping of the lower side, while the upper remained stationary. This is evidenced by the fact that the sea now comes inland farther than formerly on one side of the fissure, and remains at its old level on the other. Whether or not this was the usual occurrence is not certain, but judging from the positions of

* See Hobbs, William Herbert, *Earthquakes*, New York (1907), 72.

the two main fissures and the fact that the displacement generally took place after the earth stresses had apparently been relieved, this instance would be typical. . .

"Little violence, other than sharp earthquakes, seems to have accompanied the formation of these fissures. Natives say that a rush of gas occurred when the large one along the west side of the Pancipit Valley opened. Several people noticed clouds of dust shoot up along other fissures of the system. At Sinaysian, a *barrio* near the seacoast on the large fissure just mentioned, a number of gushing springs were noted soon after it opened. These springs are not exactly on the fissure, but occur irregularly over a small marshy area in the adjacent alluvial formation. On February 18, there were about twenty still very active, gas escaping into the air with considerable noise, and mud and water gushing up to a height of about one-half meter. . . Most of the springs had built up mud cones, perfect craterlets of fragmental tuff, perhaps 2 meters in diameter and 30 centimeters high. Both gas and water were at ordinary temperature. . .

"The most striking subsidence noted was that of Volcano Island itself. Here it was general around the whole perimeter, amounting to more than 3 meters in places. Longos Point was cut in two and the resulting small island is separated by water a meter in depth from the main island. . . A new beach is building over an old sugar-cane field on the southeast shore of the island. Cogon grass and stumps of trees with their roots intact could be seen all around the island beneath about 1 meter of water. The relative level of the lake is changed. It is lower by about 1 meter on its south shore line and is lower by a smaller amount on its north shore. The water in the upper part of the Pancipit River stands at a lower level now than formerly. The subsidence of Volcano Island would tend to lower the level of the lake on its shores but apparently not to such an extent as has occurred. It is not improbable that the whole shore line of the lake has risen slightly, reacting from the subsidence of the island at its center.

"Outwardly, Taal Volcano was little changed by the eruption. The absence of vegetation and the smooth drifted surface of the ash covering which is almost white in the sunlight, give the island an appearance of a vast snow heap. The crater rim is unbroken and save for minor fissures and cracks is intact. Sulphur is burning rather vigorously part way down its outside slope on the north side of the crater. This had never been noted before the eruption.

"The interior of the crater has been transformed. The well-known Green Lake and Yellow Lake, which were small bodies of water, one of which (Yellow Lake) was quite shallow, are gone. In the position of the former Green Lake there is a new one, the water of which appears milky-white, due to suspended solid matter. The level of this lake was on February 17 approximately 70 meters below that of the sea. Green Lake had stood 5 meters above sea level. Two streams of hot water, the combined flow of which was estimated at 100 to 150 cubic meters per minute, were pouring into the lake. These streams came out of the crater walls about 50 meters above the lake level, seeping from just over a layer of fine-grained, impervious, bedded tuff. On the west shore of the lake a conical rock 50 to 70 meters in diameter rose to a height of 115 meters above the lake level. The upper 50 meters of this natural obelisk appeared to be bedded tuff, but the lower portion is massive basalt. A week later, the streams pouring into the crater lake had increased both in volume and in number, and the lake itself had risen apparently about 5 meters. The present lake is boiling at a number of places and great volumes of steam arise from its surface. There is no evidence of a general subsidence in the crater. . . The new floor, exposed by the streams flowing across it, is composed of dense, basaltic material, hard and flowlike in appearance, certainly in place. It is probable that the change in the level of the crater floor was due to removal of material from the crater, not to the collapse or subsidence of the old floor.

"An approximation of the volume of solid material ejected from Taal Volcano is readily obtained by calculation from the data given in connection with the distribution of the ejecta. Disregarding irregularities in the ground surface, the volume of the solid represented by plotting sections, from the average depths shown, across the area covered, is 70 to 80 million cubic meters. Calculating in a similar manner the volume between the old and the new floor lines in the crater, according to areas and cross sections, the approximate figure of 45 million cubic meters is obtained for the volume removed above the level of the new lake. Examination of the crater walls below the old floor line reveals that a large portion of the material removed was rather dense, bedded tuff. If this material were ground up to a fine sand or ash and spread out in a thin layer, as mud, it would probably occupy at least one and one-half times its former volume, or about 68 million cubic meters. While these figures are approximate and represent at best only the order of magnitude of the volumes sought, yet it is evident that enough surface material was re-

moved from the crater, allowing only a shallow depth for the new lake, to make up the volume of the solid ejecta. The appearance of the ejected mud, its low temperature, and its irregular character, all bear out the conclusion that it consists almost entirely of the material removed from the surface. The few incandescent stones may have come from slightly lower down in the volcanic throat, but even these were probably originally thrown out by former volcanic activity and were only worked over recently. . .

"The official report . . . estimates the human dead at 1,335. There were recovered and buried 732 bodies. Of these, 106 were found on Volcano Island and 618 along the west shore of Lake Bombon between the *barrios* of Subig and Bayungan, inclusive. Taal exerted a devastating violence over an area of approximately 230 square kilometers (part of this area was lake surface; the land surface devastated was about 98 square kilometers). The greatest distance from the volcano at which an appreciable depth of ash fell is about 52 kilometers. . .

RÉSUMÉ

"First, the eruption of Taal Volcano on January 30, 1911, was probably the most severe, considering the number of lives lost and the damage caused, the area of the region affected and the changes wrought in the volcano itself, which has occurred in historic times in the Philippines. It was of the explosive type, the violent activity continuing only a few hours, and the attendant phenomena being typical of this class of eruption.

"Second, the principal ejecta from Taal Volcano during this eruption were steam and volcanic ash or mud. Some incandescent stones were thrown out. The volcanic ash or mud probably resulted from the attrition, by mutual friction within the cloud, of bedded tuff which was torn from the floor of the crater. Little, if any, ejecta came (recently) from a great depth. The mud or ash spread over an area of 2,000 square kilometers.

"Third, the violent action of the eruption was more effective to the west of the volcano, due largely to the contour of the crater rim.

"Fourth, a system of earth fissures opened during the eruption, the trend of which indicates a tectonic line passing through Balayan Bay, Taal Volcano, along the probable fault block, the eastern scarp of which is marked by Mount Gonzales, and through Laguna de Bay. Towns along this line near the volcano suffered most from the earthquakes accompanying the eruption, and are most liable to damage from earthquakes during possible future eruptions.

"Fifth, general subsidence of the ground level took place over a considerable area after this eruption. The island on which the volcano is located subsided and the surrounding lake changed its level. The crater was materially deepened through the removal of material from its floor.

"Sixth, the most significant thing about this eruption is the probability that all its solid ejecta were surface material and the apparent absence even at the seat of volcanic activity of molten lava, which most theories of vulcanism require to account for this type of eruption.

"Seventh, the chief agent of destruction and the main cause of death resulting from the eruption was the explosive expansion of the escaping steam, which was violent owing to its movement and suffocating owing to its heat, its burden of mud, and a content of sulphur dioxide.

GEOGRAPHICAL RECORD

AMERICA

STATE GEOLOGICAL SURVEY OF ILLINOIS. Mr. Frank W. De Wolf, Acting Director, has obliged the Society with the following notes on the progress of the work of the Illinois Geological Survey during the past field season:

Mr. Fred H. Kay, formerly of the U. S. Geological Survey and the Southern Pacific R.R., was added to the force as Assistant State Geologist on July 1. He will especially work on a cooperative study of the mining industry, the other parties being the U. S. Bureau of Mines and the Mining Department of the University of Illinois.

Mr. R. S. Blatchley continued office work on a report on the Eastern Illinois Oil Field. This field produces in the neighborhood of 30,000,000 barrels annually. Mr. G. H. Cady and Prof. U. S. Grant of the Northwestern University were associated on a survey of quadrangles along the Illinois River in the vicinity of LaSalle. These include the section reaching from the Lower Magnesian limestone to the upper part of the Carboniferous and also two or more glacial drifts.

Prof. J. A. Udden of Augustana College, at Rock Island, made a geological survey of a quadrangle at that place. Similarly Prof. T. E. Savage finished work on the Canton Quadrangle in Fulton County.

Prof. Stuart Weller completed a very interesting survey along the Mississippi River, Monroe Co., where exposures occur from the Trenton up to and including the coal measures. The region is considerably folded and faulted and has been sufficiently eroded to offer excellent exposures. It is probably the most interesting region so far examined by members of the Survey.

Mr. E. W. Shaw of the U. S. Geological Survey continued co-operative work

in Illinois and surveyed three quadrangles. The work includes the Carlyle Oil Field on which significant information was obtained.

A new map of Illinois will be issued in a few weeks. It is published by the United States and State Geological Surveys in cooperation on a scale of approximately eight miles to the inch, as a unit in the new world map on the millionth scale. As published by the State, it shows drainage, railroads, county and township lines, and the altitude of various towns. It is the first map of the State to show approximately the correct latitude and longitude for all places. It will serve as a base for the new geological map, but meantime will be distributed as a general-purpose map.

Mr. De Wolf has personally been busy with the preparation of manuscript and direction of the work of field men.

EARLY DUTCH IMMIGRATION TO THE UNITED STATES. The following facts illustrate geographical influence upon the selection of new homes. The years 1846 and 1847 saw the founding of prosperous Dutch colonies in our Middle West. The Rev. H. P. Scholte came in advance of a party of 800 Dutch farmers who sailed for this country in 1847, in order to select suitable lands for them. His pamphlet containing the history of this movement has been translated from the Dutch and appears under the title "Coming of the Hollanders to Iowa" (*The Iowa Journal of History and Politics*, The State Historical Society of Iowa, Vol. IX, 1911, pp. 528-574, Iowa City. The colony settled on prairie lands about fifteen miles southwest of Des Moines, Iowa, after Mr. Scholte had visited Michigan where he found nearly all the land covered with timber. He wrote that to the farmer who had spent most of his life in the level hay lands and fields of Holland, the battle with trees and the constant view of stumps in the midst of meadows and cultivated fields would not be agreeable. The virgin forests were cool and there was pleasure in hearing the warble of birds, but the Hollanders would much prefer to buy soils more suitable for farms and easier to cultivate. The Dutch farmers whom he represented were especially eager to possess pastures and milk cows as in Holland and to use plow and harrow on the land and they were not at all inclined to prefer ax to spade or to become dealers in wood.

POPULATION OF CANADA. Press despatches from Ottawa report that the population of the Dominion according to a preliminary statement based on the census of June, 1911, is about 7,150,000. The census of 1901 showed a population of about 5,370,000. The present totals by provinces are, in round numbers: Prince Edward Island, 94,000; Nova Scotia, 462,000; New Brunswick, 352,000; Quebec, 2,000,000; Ontario, 2,520,000; Manitoba, 455,000; Saskatchewan, 454,000; Alberta, 373,000; British Columbia, 363,000; North-West Territories (exclusive of Yukon), 10,000 [?] (20,000 in 1901). These figures represent an increase, in ten years, of 518 per cent. for Alberta, 504 per cent. for Saskatchewan, 203 per cent. for British Columbia and 178 per cent. for Manitoba, and, in five years, of 202 per cent. for Alberta, 177 per cent. for Saskatchewan and 124 per cent. for Manitoba. The population of Montreal is 466,000, and of Toronto 376,000. Winnipeg has grown from 42,000 to 135,000 in a decade.

W. L. G. J.

PROGRESS OF THE GRAND TRUNK PACIFIC R.R. The President of this railroad predicts that it will be completed from the Atlantic to the Pacific in 1914—fully a year earlier than hitherto allowed. From Winnipeg to Edmonton 95 per cent.

of the territory traversed by the line is said to be good wheat-growing, mixed farming land, and for 150 miles west of Edmonton there is excellent land. Great progress has been made with the line running through the clay belt of Northern Ontario, where again on both sides of the line good farming land prevails. The Grand Trunk Pacific will be able to assist materially the movement of the western crop this year, and the company, which has immense elevators at Fort William, expects to carry at least 12,000,000 bushels of wheat to the head of the Great Lakes. Unlike other trans-continental lines which at the outset were content with pioneer lines, which had to be rebuilt as the traffic grew, the Grand Trunk has constructed from the outset a permanent road-bed. (*United Empire*, Vol. II, 1911, p. 660.)

AFRICA

THE HEIGHT OF RUWENZORI. Capt. E. O. Henrici, R.E., communicated a paper at the meeting of the British Association in Portsmouth on the height of this range in Central Africa. The data upon which the computation was based were obtained by Capt. Jack in the course of observations made during geodetic work in Africa. The initial mark with reference to which the heights were determined was the station peg at Lake Albert Station. The position of the highest point of the range was determined as $0^{\circ}23'10''$ N. Lat. and $29^{\circ}52'15''$ E. Long. The calculations give the height of this point as 16,801.3 feet with a probable error of ± 5.3 feet. The height from the best trigonometrical data obtained up to March 1907 was 16,619 feet; height as determined barometrically by the Duke of the Abruzzi, 16,814 feet.

MEMORIAL TO MUNGO PARK AND RICHARD LANDER. It is proposed to erect a memorial to Mungo Park and Richard Lander. A committee has been formed consisting of Lord Curzon, Sir George T. Goldie, Lord Scarbrough, Major Leonard Darwin, Sir Walter Egerton, and Sir Hesketh Ball to take the necessary steps to secure funds for this purpose. Both explorers have been honored in their native towns of Selkirk and Truro, but no record of any kind exists in the land to which their lives were consecrated and sacrificed. In appealing for support, the committee remarks: "As the main object of their travels was to discover where the Niger joined the ocean, the most suitable site would seem to be its principal ocean port. It is therefore proposed to erect an obelisk of similar design and dimensions to Cleopatra's Needle on a projecting point of land at Forcados, Southern Nigeria, where it would both attract general attention and serve as a landmark to vessels approaching the port. The total cost is estimated at £2,000, exclusive of the foundations, which it is understood will be undertaken by the Government of Southern Nigeria." Donations may be sent to the honorary treasurer of the fund, Dr. J. Scott Keltie, 1 Savile Row, London. (*Nature*, Vol. 87, 1911, p. 456.)

CYCLONES, SUGAR CANE AND INSURANCE. The sugar crop of the island of Mauritius is liable to serious injury by the violent tropical cyclones which occasionally reach that locality. In the study of these cyclones, the late Charles Meldrum spent many years of his life, and the results which he obtained contributed very greatly to our knowledge of the "law of storms." In "The Sugar Industry of Mauritius: a Study in Correlation, Including a Scheme of Insurance of the Cane Crop against Damage by Cyclones" (London, 1910), A. Walter has worked out, in minute detail, a formula whence the total effect of the temper-

ature, rainfall and wind upon the sugar crop may be deduced. It is suggested that this formula be used as a basis for determining the loss due to a cyclone, and that it be applied practically for insurance purposes. The crop yield of 1908, predicted by means of the formula, proved correct within 3%.

R. DEC. WARD.

EUROPE

THE GEOGRAPHICAL EXCURSION FROM WALES TO ITALY. The Davis party in West Europe this summer saw peneplains in Devon, Cornwall and Brittany. At the western edge of the Central Plateau Professor Demangeon of Lille showed them fine interlacing land surfaces of the Limousin and Brive cycles, older and younger, above and below, with the plateau of Mil Vaches above, either a more resistant portion or a peneplain fragment of still earlier age. Within the Central Plateau, lava flows of miocene age lay in Limousin valleys and serve to date the cycle. There were also subdued glaciated mountains in Wales to study, and in Cornwall, Devon and Brittany sea coasts that showed signs enough of retreat at first glance but when the question was fairly put—how much?—confessed to but little. Jersey seemed to afford the widest marine bench at Le Hocq, with a width of barely three miles. Then there was endless vulcanism in the Central plateau, more peneplains and a new geographic term in the Morvan. The Jura must be described less simply than was the custom. Crests of anticlines have been planed off in places, as at the Cluse of St. Sulpice, in a way that strongly suggests a surface of an earlier cycle, perhaps the Limousin. In the mountains about Napf were observed singular similarities to Colorado Canyon topography in structural rock terraces along the valley sides, in spite of the climatic contrasts.

The amiability of our guides put us everywhere in touch with the people. The immediate response of building and especially roofing materials to the country rock was very striking, above all in the more modest structures. Pronounced cleavage in the rock yields veritable boards of rock used in building and fencing, alike in the slates of Welsh Bethesda and the schists of Italian-Swiss Biasca. In the Central Plateau where wood was formerly more abundant, a few old houses have roofs of shingles.

As far as the Alps the party enjoyed superb open weather, and the walk up the Hâslital was all the finer for the snow mantle cast on the summits by the rain that closed the week before in the mountains north of the Alps. The weather on the Italian side was impracticable after the first two days. About thirty persons took part in the expedition, ten French, six English, five Germans, two each from Switzerland, Italy and America and one each from Norway, Japan, Servia and Russian Poland. Among the best known names were Marr, Chisholm, Strahan, Gallois, Glangeaud, Helland, Demangeon, Vacher and Denis.

The party changed somewhat from day to day, never having less than five members and rarely more than ten. Only Professor Davis, Messrs. Praesent and Waldbaur and the writer made the whole journey, which was as enjoyable socially as geographically. An interesting but by no means typical event was a course breakfast on the summit of Puy Sancy just before which Professor Helland was able to inform Professor Davis that the latter had just been honored with the doctorate of the University of Christiania.

MARK JEFFERSON.

LIGHTNING STROKES AND TELEPHONES. In a recent investigation of the question whether or not damage by lightning is increasing in Prussia, K. Langbeck concludes that the decrease which he finds well marked during the past few years in cities is due to the great extension of overhead telephone wires. The removal of the overhead wires into underground conduits will, the author believes, be followed by an increase in lightning damage (*Met. Zeitschrift*, July, 1911).

R. DEC. WARD.

POLAR

DISAPPEARANCE OF THE ANCIENT ICELANDIC COLONY OF GREENLAND. The problem as to what became of the Icelandic colony which disappeared from Greenland in the fifteenth century, the solution of which may be materially advanced by the discovery of European-looking people on the south coast of Victoria Island (69° N. and 115° W.) by V. Stefánsson, as reported in the *Bulletin* for October (Vol. 43, pp. 771-772) is ably dealt with in a paper translated from the Danish and published in the *Deutsche Rundschau für Geographie* (Vol. 33, 1911, pp. 497-507, by Dr. G. Meldorf, late physician of the District of Julianehaab. A comprehensive survey of the literature of the subject and a consideration of all the factors involved lead Dr. Meldorf to conclude that the members of the colony were not massacred by the Eskimos, as sometimes suggested.

He says that for eighty years pirates of the Atlantic (Russian, English and others) put an end to all intercourse between Scandinavia and her colonies. Pirates ravaged the coast towns of Norway between 1393 and 1429, among their exploits being the burning of the port of Bergen and the massacre of its inhabitants. Two generations elapsed before Norwegian vessels again ventured to visit Iceland, Greenland, or even the Faroe and Orkney Islands. Meanwhile, according to Dr. Meldorf's deductions from the information he has collected, European pirates descended upon Greenland, killed many of the colonists and made away with much of their property. He quotes from G. Holm and Daniel Brunn to show that they share his view that although most of the colonists were murdered by pirates a remnant of them escaped to the Eskimos further north, were received into their families and taught the Eskimo arts of hunting and of living without the agriculture which they had practiced in their South Greenland homes; and so, perhaps, some hundreds of these colonists became merged with the natives, introducing a strain of white blood among a section of the Eskimos.

CAPT. BERNIER'S RETURN FROM THE ARCTIC. Capt. Bernier, in command of the Canadian Government steamer *Arctic*, arrived at Quebec on Sept. 29 upon his return from his voyage to the far north. He reached a point within twenty-five miles of the Banks Land entrance to the Northwest Passage, at 74°29' N. lat., 116° W. long. He found the ice conditions so bad that he was unable to attempt to reach the Pacific by that route. The expedition surveyed the 300 miles of unexplored coast from Cape Kater to Fury and Hecla Straits.

MORE NEWS FROM STEFÁNSSON. The American Museum of Natural History has received a letter from Mr. Stefánsson supplementing the information which he sent to this Society in letters dated from Oct. 20, 1910, to Jan. 21, 1911. (*Bull.* Oct., pp. 771-775). By March last sufficient food had been obtained by Stefánsson and Anderson for the two white men, two Eskimos and seven dogs on their 250 mile journey from the Dease River to Coronation Gulf. Their route lay up

the Dease River Valley, the west end of Dismal Lake and then above the Lake to its east end, thence overland to the Coppermine River and down it to Bloody Falls, whence they crossed overland to the sea near the mouth of Richardson River. They found the ice rough on the Coppermine River and very difficult for sledging. Coronation Gulf was found to contain at least three or four times as many islands as the chart indicated. Driftwood for camp fires was found on the islands, but very little on the main land east of the Coppermine River. In their search for Eskimos the explorers followed the chain of islands eastward, observing the country with field glasses for snow villages. They finally discovered two Eskimo villages near the middle of Coronation Gulf and north of the mouth of Tree River. Each village contained about eighty inhabitants. With the exception of one man who had visited Dismal Lake no person in the village had ever seen a white man. The grandfathers of two of the natives, however, had seen white men or Indians at one time on the lower Coppermine. It was Stefánsson's plan to start late in April to visit all the Eskimos living on the coast of Victoria Land. Dr. Anderson expected to spend the past summer collecting along the shores of Coronation Gulf and Victoria Land and to bring his trophies out by schooner in August.

DR. MAWSON'S ANTARCTIC EXPEDITION. The *Geographical Journal* (October, 1911), says the total contributions of the Australian government to Dr. Mawson's Antarctic Expedition amount to \$110,000. The Royal Geographical Society gave \$10,000. The total funds about Nov. 1 were \$215,000. The expedition was expected to sail for Wilkes Land about Nov. 27.

Dr. Mawson's ship the *Aurora* is 165 feet long, 30 feet broad, with a depth of 18 feet and gross register of 580 tons. She is fitted with a compound engine of 98 nominal horse power and is capable of a speed of nine knots an hour. Under steam she consumes eleven tons of coal a day. For Antarctic sailing purposes her rig has been altered from that of a schooner to that of a barkentine. Her aft has been remodelled to serve the requirements of the large scientific staff she will carry from Hobart. Most of the staff will join the expedition in Australia, the only members that sailed from England on the *Aurora*, besides the ship's officers, being Dr. Mertz, a Swiss zoologist who is an experienced mountaineer, and Lieut. Ninnis who will take part in the survey work. A valuable equipment for magnetic work has been loaned by the Carnegie Institution. The *Aurora* carried from England forty-eight Greenland dogs and a large number of Norwegian built sledges, as well as the bulk of the stores and food supplies for the three parties which it is hoped to land between Cape Adare and the Gaussberg.

PERSONAL

Dr. C. Willard Hayes, Chief Geologist of the U. S. Geological Survey, has retired to engage in technological work in Mexico. He will be succeeded as Chief Geologist by Mr. Waldemar Lindgren who has been connected with the U. S. Geological Survey since 1894. He is author of some fifty Reports published by the Survey.

OBITUARY

DR. DON FLORENTINO AMEGHINO. La Sociedad Científica Argentina announces the death of Dr. Don Florentino Ameghino, Director of the National Museum at Buenos Aires on Aug. 6, 1911.

GENERAL

THE GEOGRAPHICAL CONGRESS POSTPONED. A cable despatch received by the Society on Sept. 23 announced that the Tenth International Geographical Congress which was to have been held in Rome on Oct. 15-22 had been postponed until the spring of 1912. The despatch was signed by the Marquis Raffaele Cappelli, President of the Congress and of the Italian Geographical Society.

EXCURSIONS OF THE GEOGRAPHICAL SOCIETY OF CHICAGO. A feature of the work of this society is the excursions planned for its members by a special committee. In addition to excursions regularly provided by the committee, special excursions of an educational nature are undertaken upon written request of not less than ten members. Among the excursions planned for this fall are those to Warren's Woods, Three Oaks, Michigan, at the height of autumnal coloration; to Rock River, a trip of great interest from the standpoint of scenery and physiography; and two field excursions, one to the dune region of northern Indiana and one to the morainic region in northeastern Illinois.

MAPS FOR AIRSHIPS. In the Geography section of the British Association at its recent meeting a discussion was introduced by Mr. C. Lallemand, President of the French Association for the Advancement of Science, who described the resolutions recently adopted at his suggestion by the permanent Committee for Aerial Navigation of the Public Works Department of the French Government on the subject of the production of an international air map and the establishment of marks required by airmen. Many opinions upon the features to be included and eliminated were expressed, and the importance of cooperation between the cartographer and the airman was emphasized. Mr. Lallemand pointed out that if other countries followed the example of France, international agreements would be necessary to fix conventional signs for the map and other details, and the President of the Section expressed the view that, while much more experiment was necessary before unanimity could be arrived at, there was a tendency to agree on main lines.

GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY)

BOOK REVIEWS AND NOTICES

(The size of books is given in inches to the nearest half inch.)

NORTH AMERICA

Yosemite Trails. Camp and Pack Train in the Yosemite Region of the Sierra Nevada. By J. Smeaton Chase. x and 354 pp., map and index. Houghton, Mifflin Company, Boston and New York, 1911. \$2. 8½ x 5½.

The nature-loving public may be divided into two classes, those who have been to the Yosemite Valley and those who have not. To the former Mr. Chase's book will be not only a delightful reminder, but an amazing revelation of what lies hidden from those who have not the seeing eye. As a first visit to the Yosemite marks a crisis in one's life, those who would gain most from the experience should face it with head and heart—awake to the abounding life and loveliness of this Sierra region. Such mental and spiritual alertness is born only of knowledge; it is therefore pages like these that serve to put the prospective traveler on his mettle, as it were, against the unthinking receptive attitude of the ordinary tourist.

Mr. Chase writes with a buoyant intensity of appreciation and an exuberant imagination that cannot fail to strike fire from the duller sensibilities of the best of us. He sees not merely the form and color of flower, rock, and tree, but he individualizes each and discerns its characteristics with unerring insight. Some may take issue with him on the ground that he sees more than Nature put there, but, like the poet he is, he has recognized the instinct that "climbs to a soul in grass and flowers" and has tried to express it. On this account his occasional repetitions may be treated indulgently, not so his historic inaccuracy on page 35. There he says Sequoyah "achieved the feat of reducing the Indian languages to eighty-six syllabic characters." He therefore assumes that Sequoyah reduced *all* the Indian languages, whereas he knew Cherokee only, and made his syllabary to fit that.

The book is divided into two parts. In Part I, which treats of the Yosemite and the Sequoias, the author writes *con amore* of the matchless coniferous forests, perhaps because, as he says, "the forest is not a sight, and the forest frame of mind is not a wide-eyed wondering frame of mind," thus subtly characterizing the attitude of those who "do" the Park on schedule time. Part II describes at length a month's expedition to the lake-land of the High Sierra, the route of which is traced on a fairly clear map. This portion of the book aims to be a guide to almost unknown areas of the locality,—and the details of the outfit and line of march are given with freshness and sincerity of purpose. All of the pictures illustrate the text, and a few are exceptional examples of photographic art.

C. W. HOTCHKISS.

La Paroisse de St. Romuald d'Etchemin, avant et depuis son érection. Par l'abbé Benj. Demers. 396 pp., maps and illustrations. J. A. K. Laflamme, Imprimeur, Quebec, 1906. 8½ x 6.

A worthy contribution to the history of early Canada. The parish of St. Romuald d'Etchemin lies along the southern bank of the St. Lawrence River about four miles to the west of Quebec. In the spring of 1651 a few Frenchmen established a fishery at this place, the first white enterprise there. The book tells what is known of the conditions in this region before white settlement and since that time. The history of this small settlement illustrates the story of French development, the early enterprises of the hardy pioneers who were undaunted amid much suffering and sometimes danger. We have had from Canada few narratives of this kind more graphic, informing and interesting than this.

SOUTH AMERICA

Brazil. By Pierre Denis. Translated and with a Historical Chapter, by Bernard Miall, and a supplementary chapter by Dawson A. Vindin. 382 pp., maps and illustrations. Imported by Charles Scribner's Sons, New York, 1911. \$3. 9 x 6.

The French edition of this work, "Le Brésil au XXe Siècle," was reviewed in the *Bulletin* No. 8, pp. 626-628. It is an admirable book, comparable in the solidity of the author's insight and the adequacy of its treatment to Bryce's *American Commonwealth*. If it has a certain lack of unity so has Brazil, even politically and socially. The nearest thing to a physical unit is the great plateau near the Atlantic coast, low and terribly affected with drought at Ceara in the north, but a half mile above sea in the south and well watered. Here it breaks down to the sea in the granitic Serra do Mar of São Paulo, to the prairies of Rio Grande in the basalt cliffs of the Serra Geral. These southern cliffs hang over the tropical lowland between Espiritu Santo and Rio Grande, which man has crossed but never settled. On these cliffs the rains are all too heavy. There hangs a tropic forest as typical as in the basin of the Amazon. Above, the plateau is drier and to the summer is given an intensity among the seasons by the distance from the equator that combines with the dryness of the winter to make São Paulo the finest coffee country in the world. The short period of heat causes all the berries to ripen at once so that here alone can the whole crop be gathered in a single picking, and dry harvest time facilitates the curing of the berry. The best soils are the red earths that result from the decomposition of sheets of basalt.

Here the Paulist landowner holds patriarchal sway over huge estates. A million Italians cultivate the soil without attachment to it, for, with minor exceptions, they can buy no land. They migrate much, at times to the Argentine or back to Europe. A highly protective government brought them at its own expense, protects them fairly from abuse and caps its assistance to the land-owning class by the "valorisation" attempt of 1907, when it bought 8,000,000 sacks of the best coffee to hold for release in worse seasons, having forbidden the extension of the plantations, for overproduction has made the São Paulo problem mainly one of salvation from disaster.

Perhaps more hopeful for Brazil is the government colonization of Paraná, Santa Catharina and Rio Grande. Here is a new democracy of European small proprietors strongly contrasted with the three-century-old Paulist aristocracy,

for it is permanent and growing in prosperity, contentment and numbers. Their task has been hard. They have been sturdily winning from the soil an abundant sustenance that was not wealth for lack of means of communication and exchange. The railroad is solving their problem and transforming their condition. The danger of Germanization here or of Italianization in São Paulo is non-existent. Prosperity removes the very appearance of foreign solidarity.

The hopeless negro masses, the half-breeds of Ceara, wretched in their droughty land, but multiplying amazingly and peopling the Amazon with its scattered rubber gatherers, Brazilian economy and politics are all studied and described. The translator's work is excellent apart from his historical preface. The book has the advantage of maps and illustrations lacking to the French edition and useful if not cohering closely with the text. It will become the standard work on Brazil.

MARK JEFFERSON.

AFRICA

Khont-Hon-Nofer. The Lands of Ethiopia. By H. K. W. Kumm, Ph.D. xi and 282 pp., map and illustrations, bibliography and index. Marshall Brothers, Ltd., London, 1910. 6s. 9 x 5½.

This is the second book by the author on his journey across the Sudan. The first one "From Hausaland to Egypt" (*Bulletin*, XLIII, 535, July, 1911), gives an account of the journey, and while the author does not conceal the fact that the main object of his travels is in the interest of missions, the book is largely an explorer's story. The ethical and religious conclusions of the explorer have been collected in this second book which is dedicated largely to the missionary movement. After reviewing briefly and somewhat sketchily the journey reported in "From Hausaland to Egypt" the author turns to the discussion of the status of the Sudan in modern missions. The history of Mohammedanism, including an account of the rise of the most virile of its branches, Senussiism, is a cumulative warning against the spread of this religion. Then follow chapters on Heathenism in the Sudan, History of Missions in the Sudan, The Success or Otherwise of Missions in Central Africa, Missionary Politics and Strategic Points of the Sudan from the standpoint of the battle against Mohammedanism and Paganism. The discussion covers a great deal of ground and the author has placed in this volume the conclusions which he has derived not only from this trip across Africa, but also from extensive observations in many lands. The condition of the borderland between Mohammedanism and Paganism is clearly described, and the call to battle is a strong one. The book will probably fulfil its intention and stir into action a larger and more united body of workers in this field.

As accessories to the main part of the book are some valuable aids which include besides a number of photographs, a map, a well-considered index and a list of the missionaries in the Sudan, an extensive bibliography of the Sudan containing more than 600 titles, arranged alphabetically by authors.

R. M. BROWN.

Living Speech in Central and South Africa. An Essay Introductory to the Bantu Family of Languages. By A. C. Madan, M.A. 95 pp. Clarendon Press, Oxford, 1911. \$2. 9 x 6.

This is an unexpected contribution to the growing literature of the new philology. No question of priority is at all likely to arise for consideration by

the few zealous students who are doing pioneer discovery work in the new task of adjusting the study of speech to the history of the evolution of man. Yet it is interesting to note that while Mr. Madan has investigated his Bantu theme independently and without any apparent acquaintance with the literature of the new philology, his method was fully detailed by an American student at least five years before the date of the present volume; and in so characteristic a detail as his employment of the seed as representing a more primitive speech unit than the root he will find himself anteceded. He is dealing with the great agglutinative speech family of Africa, and on *a priori* grounds the method of research must be difficult of application, for the language represents an advanced stage in which the maximum reducibility must be to the next inferior type, the isolating. It is because of the action of this principle that the reduction of the inflected languages leads no further than to a source in agglutination. Thus, in carrying out his idea Mr. Madan is led to establish the seed of speech in the consonant structure of the Bantu to which the vowels are applicable with co-efficient value as modulants. In the American work upon the great isolating speech of Polynesia the same method of investigation and the same principles of research led to the establishment of the seed of speech in the vowel to which the consonants, as their use is acquired by training of the buccal speech organs, are applied with coefficient value. Inasmuch as the vocal use of the open throat is common to beasts and men, both using vowels; and the consonant is a possession of man alone, save as the appulse of certain animal cries may be interpreted as a movement toward consonant formation; it will be seen that if the ultimate seed of the Bantu speech is the consonant the investigation is barred from approach to the stage where the cry was becoming differentiated into speech. Nevertheless the work will be warmly welcomed as indicating the spread of interest in this newly discovered science of speech.

WILLIAM CHURCHILL.

Report of a Magnetic Survey of South Africa. By J. C. Beattie. ix and 235 pp., maps, charts, and index. Published for The Royal Society, and sold by the Cambridge University Press, London, 1909. 22s. net. 12 x 9½.

Gives the results of the magnetic survey of South Africa, the observations for which extended from 1898 to 1906. The reduction of the astronomical observations was carried out by Dr. Beattie and Mr. V. A. Löwinger. The region surveyed extends from L'Agulhas on the south to Victoria Falls on the north and from Saldanha Bay on the west to Beira on the east. More than 400 stations were occupied.

Wild und Wilde im Herzen Afrikas. Zwölf Jahre Jagd- und Forschungsreisen. Von Hans Schomburgk. Mit einer Kartenbeilage, 8 Voll- und 103 Textbildern nach Originalaufnahmen von Hans Schomburgk und J. McNeil und einem Vorwort von Carl Hagenbeck. xiv and 373 pp. and index. Egon Fleischel & Co., Berlin, 1910. M. 8. 9½ x 6½.

The author has here recorded the results of twelve years hunting in Central Africa, chiefly in German East Africa and in the British regions to the north of the Zambesi River. He lived a long time in the country of the Mashukulumbwe and the many pages he gives to his life and adventures in their land show that conditions there have wonderfully improved since they attacked and

utterly despoiled the expedition of the late Dr. Holub who lost everything he possessed and nearly perished during his retreat out of this inhospitable country. This is one of the best hunting books relating to Africa that has yet been published. The larger part of the photo-engravings are pictures of the game killed.

A Guide to the Antiquities of Upper Egypt from Abydos to the Sudan Frontier. By Arthur E. P. Weigall. xxiii and 594 pp., maps, plans, and index. The Macmillan Company, New York, 1910. \$2.50. 7½ x 5½.

This volume cannot fail to be most useful to those who visit the monuments of Upper Egypt. The author, an authority on his subject, is Inspector General of Upper Egypt for the Department of Antiquities, Egyptian Government. Each chapter in the guide book was written in, or in a few cases, only a short distance from the temples or tombs which he describes. The information is derived from prolonged personal observation and is checked by study of the few books relating to the monuments in Upper Egypt. The antiquities he describes are situated between Balianeh, the southernmost town of Middle Egypt and Adendân, the last Egyptian village north of the Anglo-Egyptian Sudan. The book is confined to a description of the ancient remains, an explanation of their purpose, with the addition of some hints as to the best methods of visiting the various sites.

Dans le Sud-Africain et au seuil de l'Afrique Centrale. Par Alfred Bertrand. 71 pp. and 58 illustrations. Librairie J. H. Jeheber, Geneva, 1911. 4 Fr. 8½ x 5½.

A short account of the present aspects of Basutoland, East Griqualand, the country of the Barotsi in the Zambesi Valley and a summary of the results of missionary work in these regions. Though a short sketch, it gives a good idea of present conditions in these parts of South Africa and of the important development that has been attained.

Zur Geologie und Hydrologie von Daressalam und Tanga (Deutsch-Ostafrika). Von W. Koert und F. Tornau. 77 pp., maps and illustrations. Abhandlung der Königlich Preussischen Geologischen Landesanstalt, Neue Folge, Heft 63. Berlin, 1910. M. 7.50. 10 x 7.

This report is based on investigations undertaken in 1902-1905 with a view to furnishing Daressalam and Tanga with an adequate water-supply system. Daressalam is at the same time the chief port of German East Africa and the terminus of the important, and rapidly extending railroad into its interior, while Tanga occupies a like strategic position with reference to the fertile district of Usambara. The report is divided into two parts. The first deals in two chapters with the geology and the hydrology of Daressalam, to which is appended a list of the geologic horizons met with in the various bore holes that were drilled. The second part deals in one chapter with the geology and hydrology of Tanga. The report is accompanied by sketch maps of Daressalam and Tanga, showing the location of the drill-holes, by geological profiles of the territory immediately adjacent to Daressalam and by numerous excellent illustrations from photographs taken by Prof. Uhlig. The report is representative of the detailed systematic work being done in the German colonies.

W. L. G. J.

Die Masai. Ethnographische Monographie eines ostafrikanischen Semiten-volkes. Von M. Merker. xxxi und 456 pp., 89 Figuren, 6 Tafeln, 62 Abbildungen und einer Übersichtskarte. Zweite verbesserte und vermehrte Auflage. Dietrich Reimer (Ernst Vohsen), Berlin, 1910. Mk. 12. 11 x 8.

This second edition, enlarged and even improved, is a fitting memorial to one of the most truly inspired investigators that ever a primitive people has had. In the first edition it was clear that Captain Merker not only knew about the Masai but that he knew the Masai in the life they led. In the five years which elapsed between the first edition and this later production the reading public had advanced to a point where knowledge of the Masai was eagerly sought.

The first edition of this work had been exhausted in three years and there was demand for something yet more complete. In his arduous duties in the Masai highlands Merker renewed his zeal, he found time, or made it, to plan the recasting of the former work with the addition of the store of material which he had newly acquired. Death in that fever-bitten land is never unexpected, but it came suddenly to this busy administrator and scholar. His notes, however, were in such orderly form that it has been possible for his two editors and friends to insert them in their proper places and thus to produce a new work which is abundantly representative of the plans of its author. It is ethnography of the best sort, it is written throughout from the outward glance of the man who practises each of the arts, who follows in his own intelligence each of the customs here so appreciatively recorded. Because the Masai, a nomad people within a wide range, are a Semitic folk, their ethnography has an appeal to the general reader far greater than would be the similar study of any other people of Africa. The condition of their life has been such that they tend to conserve the most archaic customs of the other wandering Semites. They are, therefore, most illuminative of the primitive beliefs of the people whose similar customs have undergone evolution from rigid monotheism into a mystery of triune monotheism which has become numerically one of the greatest of world religions though humblest in its beginning.

WILLIAM CHURCHILL.

Nigeria and Its Tin Fields. By Albert F. Calvert. xvi and 188 pp., maps and illustrations. Edward Stanford, London, 1910. 3s. 6d. 7½ x 5.

This volume is a pioneer book on the development of tin in this English protectorate and, in the main, it is a prospectus of the properties. In Part I the early days in northern Nigeria, development by steamship lines and by the Niger Company, the beginning of tin washing and the discovery of the Bauchi tin wealth are briefly treated; next, the reports on the development of the tin industry and working the mines are discussed, together with the geological report, analysis of the tinstone concentrates, expert reports, possibilities of transport, topography and climate of the Bauchi province, and the question of labor. An examination of the commercial and political outlook follows. The tin deposits are scattered over 2,500 square miles and the tin is considered better than the Straits' tin. The Bauchi province is over 3,500 feet above sea level, is hundreds of miles from malarial swamps and is a healthful and fertile district. The chief drawback is the inaccessibility of the field and the difficulties of transportation. The author discusses the cost of transport and enumerates the railroad lines of Nigeria. The Government is said to be projecting a line from the Baro-Kano railroad to the center of the tin district, about 125 miles.

Part II is headed "Particulars of Companies working tin properties in Northern Nigeria." In this section, twenty or more companies are listed, each report being in the form of a prospectus, showing capital invested, naming directors and describing the areas under the control of the various companies. Part III is a copy of the new mining regulations for Northern Nigeria. At the end of the book and comprising about two-fifths of it, are pictures and plates. Among them are 234 photographs, mostly of scenes throughout Nigeria, four maps which show Southern Nigeria, Northern Nigeria and the railroad routes, and 21 plans of the different tin fields. The book also gives much general information concerning the protectorate.

R. M. BROWN.

ASIA

The Call of the Snowy Hispar. A Narrative of Exploration and Mountaineering on the Northern Frontier of India. By William Hunter Workman, M.A., M.D., and Fanny Bullock Workman. With an Appendix by Count Dr. Cesare Calciati and Dr. Mathias Koncza. xvi and 268 pp., maps, illustrations, and index. Charles Scribner's Sons, New York, 1911. $9\frac{1}{2} \times 6\frac{1}{2}$.

This book is another memorial to the enormous labors of the Workmans in the exploration of the higher Himalayas. The special objective of the expedition of 1908 was the investigation of the Hispar glacier and its tributaries. During previous expeditions the glacier had been seen and the border region had been explored to some extent so that the locality was not altogether a strange one to the explorers. The expedition left Srinagar late in May and early in June was at Hispar, near the lower terminus of the great glacier, by the middle of August reached the head of the Hispar ice field at Hispar Pass, a point which had been attained in a previous expedition, and entered Srinagar again in October.

The book is a story of every detail of the journey, including the equipment, the problem of coolie transport and the arrangement for the commissariat service as well as the accounts of marches and attainments. The absorbing chapters of the book are IV and VII. In the former, the ascent of Triple Cornice Peak, 19,000 feet, by the way of the Haigatum tributary of the Hispar glacier, accompanied by all the dangers of snow-capped mountain peaks, is described, and what words fail to tell of this accomplishment is shown in well selected photographs. Chapter VII is the climax of the book in that it tells of the ascent of the Biafo-Hispar Watershed Peak, 21,350 feet. From a camp 19,100 feet high on the flank of the Peak, two parties set out, Dr. Workman with one porter to visit the lower summit and Mrs. Workman with three assistants to ascend the main peak. Mrs. Workman's feat in reaching the summit along an arrête, sharp and long, was magnificent in that it was successful. Much space is given to the troubles with the coolies and this is justified for the reason "that the province of the explorer is, among other things, to chronicle for the benefit of others the ethnological peculiarities of the inhabitants as well as the features of the regions he investigates." Like the other books of travel written by the Workmans, this book is beautifully illustrated with an abundance of photographs, some of them telephotographs and others panoramic views, which are carefully selected to explain various phases of the journey. An appendix by two trained surveyors gives us a scientific account of the glacier and its tributaries and adds great value to the volume. The map which is the result of their survey is excellent in itself and as a guide to the reader.

It is a far cry from the Karakoram to the Andes, from magnificent accomplishments to a contentious spirit. The newspaper controversy between Mrs. Workman and Miss Peck has not been pleasant reading, and it is a grave mistake to add as the final chapter of the account of this praiseworthy exploration of the Hispar glacier the report of the expedition sent by Mrs. Workman to Peru which showed "that the altitude of the lower summit of Huascaran, claimed to have been ascended by Miss Peck, is some 1,500 feet lower than the highest altitude attained by Mrs. Bullock Workman." R. M. BROWN.

Siberia. A Record of Travel, Climbing, and Exploration. By Samuel Turner, F.R.G.S. With an Introduction by Baron Heyking. 320 pp. with 46 illustrations. Charles Scribner's Sons, New York, 1911. 8 x 5 1/2.

A reprint of a good book written largely from a business man's point of view, but also rendering some geographical service in a neglected part of Siberia, which was reviewed in the *Bulletin*, Vol. 38, 1906, p. 259.

Cyzicus. Being some Account of the History and Antiquities of that City, and of the District Adjacent to it, with the Towns of Apollonia ad Rhyndacum, Miletupolis, Hadrianotheræ, Priapus, Zeleia, etc. By F. W. Hasluck. xii and 326 pp., 24 illustrations, 3 maps, appendices, bibliography and index. Cambridge: University Press, 1910. \$3.50. 8 1/2 x 5 1/2.

The first part of the work deals with the topography of the Cyzicus district, the archæological work that has been done there and the history of the townships around Cyzicus. The endeavor is made to show ancient and modern conditions side by side. A separate chapter is given to the discussion of the road system. The second part treats of the history of Cyzicus. The chief purpose of this careful work is to correlate the available information and put it into convenient form for the use of future archæological workers in this part of Asia Minor.

The Veddas. By C. G. Seligmann, M.D., and Brenda Z. Seligmann. With a Chapter by C. S. Myers, M.D., D.Sc., and an Appendix by A. Mendis Gunasekara, Mudaliar. xix and 463 pp., illustrations, maps and index. University Press, Cambridge, 1911. \$5. 8 1/2 x 6.

Students of the primitive must feel an interest in the Veddas of Ceylon because they are probably the sole survivors of the lowest scale of social organization. This volume contains the result of the minute examination of this rude folk made by Dr. and Mrs. Seligmann. They have been very painstaking in their research, every note is accompanied with full description of the conditions under which the observation was made. It is excessive straining after accuracy. Just one sample will suffice. On page 50 we find, "these men came up to one of us (C. G. S.), shook hands" and "she tried to feed one of us (B. Z. S.) with yams." By such contrivances it has been possible to make stupid a theme which in itself has a thrill. It is probable that the interested inquirer will read the brilliant work of the brothers Sarasin for the life-story of the Veddas and will turn to this volume for the hard facts. While the manner of presentation is open to serious objection the work is undoubtedly very valuable. The Veddas are undergoing rapid absorption into the surrounding Sinhalese population and there may be no opportunity to subject them to such study as has been bestowed upon them by these observers. This is a storehouse of facts which will stand as the authority for the work of more inspired students. WILLIAM CHURCHILL.

Aus dem Märchenlande von 1001 Nacht. Beobachtungen und Abenteuer eines Geologen in nördlichen Persien. 1. Band. Von Hans Pohl. xii and 208 pp., illustrations and index. Verlag von Gustav Körner, Leipzig. Mk. 2. 8 x 5½.

The author is Professor of Geology in the University of Bonn. His visit to northwestern Persia was largely to study its geology. He found, upon returning home, that most of his scientific results and many observations of a general nature, had not yet appeared in literature relating to this region. His route was from the Russian Black Sea Port of Novorossinsk (ice free the year around) to Batum; thence to Tiflis, the capital of Trans-Caucasia, thence southward by rail to Erivan and then to Mt. Ararat on the boundary between Trans-Caucasia and the extreme northwest of Persia. He traveled southward to Choi and Tabris and to the latter city he gives the two concluding chapters of the first volume. The book is a general description of his journey, with geological notes along the way, but in this popular account, geology is not more prominently presented than geographical description and characterization of the peoples, their life, well-being, industries, etc. The author comments only on things that are well worth while. It is a very readable and informing book.

Religion und Kultur der Chinesen. Von Wilhelm Grube. vii and 220 pp., and illustrations. Verlag von Rudolf Haupt, Leipzig, 1910. M. 3.

This is a posthumous work and one which makes us sorry that we shall have no more contributions by the author on the subject. He places special emphasis on the fact that, of all ancient civilisations, that of China is, although the most remote, the only one that has survived to this day, in its ancient form. 'Whatever changes have taken place in China since the oldest times are insignificant in comparison with the astonishing stability of its conditions in general: language and religion, public and domestic life, habits and customs, as we find them illustrated in its uninterrupted historical traditions whose authenticity has been proven as far back as 841 B. C. The geographical isolation of the country is the paramount cause of this astonishing conservatism. Throughout her history China came in contact with only those peoples whose civilisations were inferior to her own. They could not teach her anything, and gave her no competition which would have stimulated progress.

As a compendium of what every student of China ought to know about its religion and cult, no better book than this can be imagined. M. K. GENTHE.

L'Indochine française. Par Henri Russier et Henri Brenier. 356 pp., avec 56 Gravures dans le texte et 4 Cartes hors texte en couleur. Librairie Armand Colin, Paris, 1911. Fr. 4. 7½ x 4½.

In two years this work has passed from a text book of local geography designed for use in the secondary schools of Hanoi in teaching the Indo-Chinese, and this second edition embraces the wider scope of a valuable geographical compendium of the Asiatic possessions of France. How great that colony is may best be shown by comparison with the metropolis; the sum of the areas of the five lands of the peninsula, Tonkin, Annam, Cochin China, Cambodia and Laos, falls little short of being half as large again as France. Nor is area the only criterion; despite the expenses of the earlier wars of conquest this colony has come into economic importance, the only French colony which is by way

of showing itself profitable to the business community at home, for in the fifteen years for which statistics have been compiled the total exterior commerce has leaped from \$34,000,000 in 1892 to \$98,700,000 in 1908.

More than half of this commerce passes through the port of Saigon, the administrative center, a city which with the inclusion of its overgrown suburb of Cholon has a population of 250,000. The text is brilliantly illustrated, though the good half-tone cuts have received scant justice on the press through neglect of overlays, but the four charts are in better case and are wholly free from the minute pettiness with which so many geographers obscure the salient detail which it is their aim to present. In the chapter dealing with the population of this area the authors have acted wisely in omitting the controversial matter; their account represents the fair mean of that which is most generally accepted, and the disputes are better left to the journals of ethnography. In some glorified and radiant hereafter it may perhaps be hoped that the French will discover the value of the index.

WILLIAM CHURCHILL.

The West in the East from An American Point of View. By Price Collier. ix and 534 pp. Charles Scribner's Sons, New York, 1911. \$1.50. 8 x 5½.

Mr. Collier had a good time in his discovery of Asia, principally in India, for no more than three chapters deal with his traffic with China, Japan and Korea. His narrative is bright, frequently witty, quite as frequently what the English designate "not wholly nice." He deprecates the idea that the ages old Orient can be learned within the travel span of the most interested observer, he depreciates the work of others whom he considers to have offended in that particular; yet he shows no diffidence in solving the most intricate of problems, that racial problem which the centuries have never been able to settle, the problem of the terms on which the whiteskin is to live with the more highly pigmented epidermis. Furthermore, when with a cheap fling at Boston one drops just once into Greek and quotes Pindar's "navel of earth," it is just as well to remember that the Boston at which he jeers can probably spell its Greek correctly, can put the accent on its proper syllable and does not normally write the accent before the *spiritus lenis*, a record of three mistakes in one word. When he passes beyond the province of American English he fares scarcely better. He cites the horse as a "whaler" when the briefest inquiry would have taught him that the name arises from the place of breeding in New South Wales. His pronouns lead him into messes that might easily have been avoided. In his description of a morning ride in India he writes "my tent measures so-and-so — your clothes are laid out, the hot bath is ready." Yet even in the East the best folk take their own baths and are quite careful to wear their own clothes. Those who have given toilsome years to the effort to comprehend an alien culture which always presents some new and unexpected complication are by now reconciled to the books of passing voyagers, but when they think of the effect which such work has upon those at home who comprehend so little of the tragedy at the edges of life they welcome each new book none the more cordially. And the greatest harm is done by the books which are as readable as this.

WILLIAM CHURCHILL.

EUROPE

La Belgique moderne. Terre d'Expériences. Par Henri Charriaud. 390 pp. Ernest Flammarion, Éditeur, Paris, 1910. Fr. 3.50. $7 \times 4\frac{1}{2}$.

One of the illuminative and interesting studies of countries of which the house of Ernest Flammarion has published a considerable number. It is only in small part a geographical study. It treats of Belgium in relation to its languages, provincial and communal life, education, political tendencies, the system of land holdings, co-operative enterprises, labor, commerce, etc. In brief, it is the study of a people, their social development, and the influence of their institutions upon them.

Beiträge zur Kenntnis der Höhengrenzen der Vegetation im Mittelmeergebiete. Von Dr. Max Koch. x and 310 pp., bibliography and diagrams. Druck und Verlag C. A. Kaemmerer & Co., Halle a. S., 1910. $9 \times 5\frac{1}{2}$.

The results of this study were accepted as a dissertation by the philosophical faculty of the University of Halle. Considerable attention is given to the position of the snow line in various parts of the regions under consideration, and the upper limits of the growth of a large number of plants are given.

Old Country Inns of England. By Henry P. Maskell and Edward W. Gregory. ix and 294 pp., illustrations and index. L. C. Page & Company, Boston, 1911. $8 \times 5\frac{1}{2}$.

This topic has never been fully treated. The book gives a classification and description of the old inns which sheltered the English forefathers before the days of rapid transit and served as their usual place for meeting and relaxation. Interwoven with the story of these inns is much of the history of times and manners in the days when they were most important. Many of the old inns are now gone, for few flourished after the railroad succeeded the coaching system. In provincial towns and hamlets, however, there is still a large number of small inns. Among the nineteen chapter headings are "Manorial Inns," "Monastic Inns," "Coaching Inns," "Historic Signs and Historic Inns," "The Inns of Literature and Art," "Haunted Inns," and "Old Inns and their Architecture."

Bathymetrical Survey of the Scottish Fresh-Water Lochs. Conducted under the direction of Sir John Murray and Laurence Pullar during the years 1897 to 1909. Report on the Scientific Results. Vol. I, 785 pp., map, illustrations, bibliography and index; Vol. II, 281 pp., and illustrations; Vols. III-VI, plates. Challenger Office, Edinburgh, 1910. £5 5s. $9\frac{1}{2} \times 6\frac{1}{2}$.

This great work has been everywhere accepted as the largest and most important contribution to limnology yet made. Much of the material was published in the *Geographical Journal* and the *Scottish Geographical Magazine* before its appearance in book form. The work records the investigation into the bathymetry of the fresh-water lochs or lakes of Scotland between 1897 and 1909. The larger part of the survey was given to the determination of the depths of the lakes and of the forms of their basins. A great many observations, however, were carried out in other branches of limnography. Vol. I, mostly new matter, includes many articles dealing with the results of these studies from the topographical, geological, physical, chemical and biological points of

view. Various theoretical considerations are also advanced, and the Scottish lakes are compared with lakes in other parts of the world. The volume concludes with an exhaustive bibliography of limnological literature which will be invaluable to students of this subject. The special descriptions of the lakes appear in Vol. II, and the maps of them fill the four other volumes. Throughout the text are many maps showing the drainage areas of the districts in which the lakes are situated. All the survey maps were prepared and printed by the Bartholomew map house and are very fine specimens of cartography. Science is much indebted to Sir John Murray and Mr. Laurence Pullar for planning and carrying out this great work of research.

The High-Roads of the Alps. A Motoring Guide to One Hundred Mountain Passes. By Charles L. Freeston, F.R.G.S. Second Edition Revised and Enlarged. xvii and 392 pp., with 110 itineraries, 102 photographic illustrations and 11 maps and diagrams and index. Charles Scribner's Sons, New York, 1911. $8\frac{1}{2} \times 5\frac{1}{2}$.

An improved edition of this excellent book which was reviewed in the *May Bulletin*, pp. 381-382.

La Vie Politique Orientale en 1909. Par Dr. Georges Samné and Y. M. Goblet. xi and 317 pp., and appendices. Editions de la "Correspondance D'Orient," Paris, 1910. Fr. 6. $9 \times 5\frac{1}{2}$.

A careful review of political and social conditions in Turkey, the Baltic Peninsula and Morocco. Among the subjects discussed are the Balkan crisis of 1908, Turkey under constitutional government (to which a third of the book is given), affairs in Greece, the Persian Revolution, Egyptian questions and the events of the past two years in Morocco. A chronology of thirty-two pages summarizes the recent history of these countries.

Die Flüsse Deutschlands. Von Ed. Gennerich. Unter Benutzung der von Herrn Geheimrat Keller bearbeiteten Stromwerke. Sonderabdruck aus der *Zeitschrift für Gewässerkunde*, Bd. VIII, Hefte 3 u. 4. 168 pp., Verlag u. Druck von Wilhelm Baensch, Dresden, 1908.

The small volume is an attempt to condense, and make accessible to a wider circle of readers, the contents of the famous standard monographs on the Rivers of Germany. It contains the volumes at low, medium, and high water of each of the more important rivers: Rhine, Ems, Weser, Elbe, Oder, Vistula, Pregel, Memel, and explains their relation to the size, rainfall, soil, vegetation, climate, of the respective drainage areas, together with the grade, average width, and navigation, of the principal inland waterways of Germany. It will be a welcome addition to the reference library of the potamo-geographer who cannot afford to consult the bulky original monographs.

M. K. GENTHE.

PHYSICAL GEOGRAPHY

Characteristics of Existing Glaciers. By William Herbert Hobbs. xxiv and 301 pp., maps, illustrations, and index. The Macmillan Company. New York, 1911. \$3.25. 9×6 .

Scholars in great libraries do not always recognize their responsibility to use their books. This Professor Hobbs has done. He has made a wide survey

of the scattered sources and gathered here an extremely interesting collection of maps, pictures and observations on glaciers and snow fields of all kinds. Surely all students of earth science will thank him for this work and the ample references.

He divides his subject into Mountain Glaciers, Arctic Glaciers and Antarctic Glaciers. In the first he proposes a much-increased attention to cirque formation as the dominant process at high levels. He objects to the name Valley Glaciers because they rarely get far into their valley, lying mostly within the "mother cirque" (p. 52). He would call them rather Radial (Alpine), the second of which names is not new. His classification of Mountain Glaciers under fifteen heads seems to hang together badly. Decreasing snow alimentation is the criterion and it governs 2, 3, 5, 6, 14 and 15 very well if the other nine are omitted.

The large collection of data concerning polar glaciers is of very great value. It is good reading, though so hastily written in places as to be puzzling. Through it runs the thread of a discovery that Professor Hobbs has made about the winds and pressures near the poles. "Unfortunately the theory of polar eddies promulgated by Ferrel and adopted by Davis in his, in many respects, excellent treatise is responsible for a general prevalence of incorrect views concerning the winds of both the earth's polar regions" (p. 265). The 'discovery' is that a local "fixed anticyclone" exists on Greenland and Antarctic, causing outward winds in every direction. So far the discovery is reconcilable with Davis's treatise on meteorology (see p. 231). But Prof. Hobbs holds that the snowfall nourishes the ice sheets by the descent of cirrus ice grains from heights of 14,000 to 25,000 feet down upon the surface, as the cold, heavy, lower air slips off down the slopes of the ice dome. These grains "are melted and vaporized by adiabatic warming and on reaching the cold surface layer of air next the ice are quickly congealed to form flakes of snow" (p. 287). The process is finally checked by too much adiabatic heating, which softens the snow and makes it sticky. Then a long calm allows the heat to radiate away again.

A somewhat headlong seeking for evidence of this process and an ignoring of obvious difficulties mar a very interesting volume, but it remains still a volume of value and interest.

MARK JEFFERSON.

Handbuch der Klimatologie. Von Dr. Julius Hann. Professor an der Universität Wien. Band III. Klimatographie. II. Teil. Klima der Gemässigten Zonen und der Polarzonen. Dritte, wesentlich umgearbeitete und vermehrte Auflage. ix and 713 pp. J. Engelhorn's Nachf. Stuttgart, 1911. 23 marks unbound. 9 x 6½.

No discerning person can look through the final volume of the third edition of Hann's magnificent work without being impressed by the author's absolute mastery of his subject. In these days of the rapid growth of scientific literature, whoever, as a recognized authority, critically summarizes this literature, and thereby makes it accessible to his colleagues, is doing an important work. Hann has, for these many years, been rendering just this kind of invaluable service to all who have been trying to keep up with the rapidly-increasing flood of meteorological and climatological literature. We say "trying to keep up," for it is safe to assert that there is but one man in the world who really succeeds in keeping up. And that one man is Hann. No one who has not made a

serious effort to keep abreast of this literature can appreciate what it means to be the master of it. Yet Hann is much more than a compiler for others, important as that function is acknowledged to be. He does not merely give us a well-digested and readable summary. He is not content with presenting the work of others just as they left it. When published climatological data need revision, correction, reduction, in order to make them scientifically valuable. He carries out that revision. He gives us better, and more, than do many of the original authorities from whom he has collected his data. In addition, his own original researches, covering a very wide range of subjects in meteorology and climatology, carried on for years with marvelous patience and skill, make every page of his published works a store-house of exact and authoritative information.

All who are in any way concerned with the science of the earth's atmosphere will unite in extending their hearty congratulations to the veteran author upon the completion of this work. The volume deals with the climatology of the temperate and polar zones, the second having taken up the tropics. It is absolutely "up to date." Following an excellent custom, the author has noted, at the end of the Appendix, "geschlossen Mai 1911." Thus anyone who wishes to look up any subject on which he needs the latest data, knows exactly where Hann left off, and where he must begin. The final proof was read in May, and the printed volume was in the present reviewer's hands by the middle of July. There are references in the Appendix to articles which appeared in April, 1911. The one great fact which impresses itself upon the reader of this volume is the tremendously wide range of the author's reading, and his remarkable power of assimilation. Nothing seems to have escaped his watchful eyes, or to have been an excessive burden upon his unfailing memory.

It may seem to many that "dry climatological data" cannot possibly be made interesting. Yet our author, by his vivid descriptions of weather types; by his frequent reference to the effects of climate upon vegetation, upon crop distribution and upon human activities; and by his well-chosen quotations (*e. g.*, Middendorff's remarkably vivid description of the Siberian winter cold), has succeeded admirably in giving us a book which is far from being "hard reading." Many general readers will find much to interest them as, for example, the discussion of the winter climates of the Mediterranean health resorts; of possible climatic changes in Palestine; the description of the weather conditions experienced; and the excellent account of the general characteristics of polar climate, in which are embodied the Nansen-Mohn isothermal and isobaric charts of the north polar area. Our increasing interest in South America gives special interest to the admirable account of the extra-tropical climates of that continent, in which are included such recent publications as those of W. G. Davis on the climate of Argentina (1910), and the several noteworthy papers, of anthropogeographic interest, recently published by Prof. Isaiah Bowman, of Yale.

The section on the United States, of nearly 100 pages, is especially worthy of attention. Without detracting in any way from the importance of Prof. A. J. Henry's "Climatology of the United States" (*Bulletin Q*, Weather Bureau), to which Hann acknowledges that he is indebted for much of his information, it may be said that there has been no general recent account of the climates of the United States as good as that contained in this volume. *Bulletin Q* was, of course, intended as a climatological dictionary, rather than as a connected and concise description and analysis of climate. The criticisms which our author makes of the published temperature data for the United States and of the lack

of strictly comparable mean temperatures are justified (Hann has himself reduced some of the temperatures to the 33-year mean), and we are glad to note his appreciation and commendation of the new climatological summaries, by sections. We are especially glad to note the retention, from earlier editions, of Lorin Blodget's description of the general characteristics of the United States climates east of the rooth meridian. Blodget's "Climatology of the United States" is a classic, although almost unknown to the younger generation of meteorologists. Indeed there is much of real climatological interest and value in many of the older accounts of North American travel and exploration, as *e. g.*, in the *Journals* of the Lewis and Clark Expedition. Dr. Fassig's excellent report on the climate and weather of Baltimore receives well-deserved commendation.

R. DEC. WARD.

ECONOMIC GEOGRAPHY

Der Pflanzenbau in den Tropen und Subtropen. Von Professor Dr. Max Fesca. Dritter Band. xiv and 361 pp. Verlag von Wilhelm Süsserott, Berlin. 1911. 8½ x 5½.

The concluding volume of Prof. Dr. Fesca's valuable work on economic plants in tropical and sub-tropical regions. The present volume includes citrus and other fruits, oil yielding plants, gums, spices and aromatics, drugs, rubber, gutta-percha, dye stuffs, tanning stuffs, and barks (varieties of cork). The varieties of each species, the climate and soil suitable to them, their cultivation, uses, diseases, product, etc., are treated concisely without sacrifice of essentials. One hundred and three pages are given to rubber and gutta-percha. The three volumes form an authoritative and comprehensive work on this subject.

The Natural History of Coal. By E. A. Newell Arber. x and 163 pp., illustrations and index. Cambridge University Press, 1911. 1s. 6½ x 5.

This is one of the little "Cambridge Manuals of Science and Literature." The author attempts, with good success, to answer simply such questions as the origin of coal, how it was formed. He also discusses problems relating to the geology or the paleobotany of coal, some of which are not yet solved or at least not satisfactorily elucidated. The book ends with a good bibliography and an index.

ANTHROPOGEOGRAPHY

Influences of Geographic Environment, on the Basis of Ratzel's System of Anthro-po-geography. By Ellen Churchill Semple. xvi and 683 pp.; 21 maps. Henry Holt & Co., New York, 1911. \$4.

Ratzel carried the investigation of geographic influences upon man and history a long step forward and embodied much of the fruit of his research in a book; his *Anthro-po-Geography*. Moreover, he inspired a pupil to take up the investigation and carry it forward. This was a greater service. That pupil was Miss Ellen C. Semple, an American. To produce a book like this requires a combination of four factors not often within the reach of one person,—deep interest in a great subject, ability to handle it, training, and leisure. Nor does this imply that Miss Semple's book is simply the product of leisure hours. On the contrary, it bears every evidence of having cost a prodigious amount of labor.

The seventeen chapters deal with: The Operation of Geographic Factors in History, Classes of Geographic Influences, Society and the State in Relation to the Land, Movements of Peoples, Geographic Location, Geographic Area, Geographic Boundaries, Coast Peoples, Oceans and Enclosed Seas, Man's Relation to Water, The Anthropogeography of Rivers, Continents and their Peninsulas, Island Peoples, Plains, Steppes and Deserts, Mountain Barriers and their Passes, Mountain Environment, The Influences of Climate upon Man.

Miss Semple, or anyone else, who attempts to estimate the actual weight of geographic influences in the history or development of a people, attempts the impossible. The influences which have directed the course of history are too complicated. The same influences are not equally effective in different periods of history. Whatever part geographic influences had in making Ancient Greece, it is evident that those influences are not effective now, or else they are offset by other and stronger influences which were not operative in ancient times. In her chapter on the Operation of Geographic Factors in History, the author clearly takes the ground that Geographic Influences themselves undergo a process of evolution and that a set of factors which brought about a certain result in an earlier stage of history, may not do it in a later stage.

Unquestionably Miss Semple has tried faithfully to be conservative and guarded in her statements. She believes enthusiastically in her thesis; and there are frequent statements in her book which, if taken literally, seem extravagant. For example, "It was the Danube that, in the fourth century, carried Arianism . . . to the barbarians of Southern Germany and made Unitarians of the Burgundians . . ." Of course, this is a figure of speech, not intended to be taken literally. The author herself says (page 11), "The study of physical environment as a factor in history was unfortunately brought into disrepute by extravagant and ill-founded generalization, before it became the object of investigation according to modern scientific methods." All in all, a careful and friendly reader can not escape the conviction that the author has aimed to be conservative. An unsympathetic reader may not grant that she has always been successful in that endeavor.

One thing that impresses the reader is the enormous breadth of reading, the endless verifying of references, the search and research, the sifting and resifting of material, involved in the preparation of the book. There are nearly 1,500 citations of authorities. The chapter on Island Peoples alone is followed by 223 references. The geographers of the English-speaking world will thank Miss Semple for a generation to come for her splendid work in preparing this bibliography.

There is method in every chapter of the book. The framework stands out clearly and is usually indicated by the marginal sub-heads. General principles are stated, usually as topic sentences of paragraphs, then follow illustrations. The treatment of "Man's Relation to the Water" will illustrate. After laying down the general thesis that man uses the waters of the earth as places for passing and repassing, not for his abiding, the author gives some twenty-five examples of peoples, chiefly among primitive races, who live or lived in pile dwellings, in boats, or who otherwise chose the water rather than the land for an abiding place. Then follow examples of the reclamation of land from the sea as in Holland, or from river floods, as in China; the practice of irrigation in many lands and its socializing and unifying effect upon communities; the effect of coast line and of fishing upon the maritime development of a

people. This formulation of principles—this terse statement in words of great truths which all of us have imperfectly thought out, this collecting of many illustrations—are the qualities in the book which give it substance.

The index is a model of completeness and will add vastly to the usefulness of the book for reference purposes. An idea of the completeness of the index may be gathered from the fact that there are over 100 page references to *Nomads*, twenty-five to *Fur Trade*, fifty to *England* and one hundred to *Boundaries*. There are forty-five double-column pages in the index.

If the reviewer were disposed to look for faults in the book they doubtless might be found. But the great service which Miss Semple has done for Geography, the years of work which the book has cost, the pardonable pride which we feel in knowing that an American Geographer did the work, all impel this reviewer, at least, to dwell upon the excellencies of the book rather than to seek minor points of weakness.

R. H. WHITEBECK.

EDUCATIONAL

The Continents and Their People: North America: A Supplementary Geography by J. F. Chamberlain and A. H. Chamberlain. xi and 299 pp., maps, illustrations and index. The Macmillan Company, New York, 1911. 55 cts. $7\frac{1}{2} \times 5$.

Intended "to supplement and enrich the work offered by the text-books in geography." Although the authors in the preface say that "mere statement of fact is not geography" and believe that in their book "cause and consequence have been related" their product shows lack of grasp of the subject and ignorance of modern geographical methods, with the result that the very element of correlation which they claim for their book is excluded. Their indulgence in vague generalities also is unfortunate though typical of too many text-books in geography. The references to the Glacial Period and to various physiographic processes, even if conceded to be justifiable in a book intended for use in grammar schools, are purely casual and confuse rather than further the development of conceptions. The maps are of the usual uncritical type.

W. L. G. J.

Elements of Geology. By Eliot Blackwelder and Harlan H. Barrows. 475 pp., maps, illustrations and index. American Book Company, New York, 1911. \$1.40. $7\frac{1}{2} \times 5$.

The book makes a point of relegating volcanoes and earthquakes to the minor place where they belong, and of presenting its matter in a way to cultivate the reason. In good hands it will probably do so. The questions seem well planned for the purpose. Perhaps it is a little hard on other authors to ask them to admit that they have not had the same intention. Another feature is the introducing the historical part by an account of the chief animal and plant groups, which is a good thing.

Very noticeable in this part is the almost complete omission of cuts or descriptions of fossils. The material used is living, similar forms or restorations of the ancient ones. So far the pendulum has swung. Perhaps this is an over-emphasis, for the geologist is concerned with fossils not a little as mere fossils, marking strata, as they might do were they the mere sports of nature they were once believed to be. Without reference to the living forms that made them, they serve him to establish rock structures and displacements.

A geographer must be delighted with the simplicity of the scheme of North American topographic regions at p. 63. Most such classifications are far too complex. Equally will he welcome the maps of Tertiary mountain folds at p. 438 and Paleozoic ones at 372.

The respect shown the planetesimal theory is natural and acceptable, but when it is said of the nebular hypothesis that it is "improbable that the materials which became the planets could have separated from the equatorial portion of the nebula in the form of rings" the student will be justified in asking "Why not?". Of course he does not ask questions. He does not venture on excursions into reasoning. He sees his author is *against the hypothesis*, and follows the cue!

The summaries after igneous rocks and closing chapters V and VI are good. Similar ones would well close other chapters, too. Why not admit (p. 188 and 230) that streams and glaciers *deposit* as explicitly as it is stated that they wear down? In the Great Lake country, above all.

The changed groupings of Eras and Epochs may be necessary with growth, but for school texts it is unfortunate. Since the last text that has come to this reviewer's hand one geologic Era has disappeared—the Algonkian and eight new periods have arisen.

The text-book is a very good one. It lacks a geologic map, but for the rest is well illustrated with abundant good pictures and maps.

MARK JEFFERSON.

Commercial Geography. By Albert Perry Brigham. xv and 469 pp., 17 colored maps, 238 diagrams and illustrations, and index. Ginn & Company, Boston, 1911. \$1.30. 8 x 5½.

Those who are interested in either the study or teaching of geography will welcome this new text from the pen of Prof. Brigham. The author's reputation for scholarly work is sufficient guarantee that in this respect the book is all that could be expected or desired. The treatment of the subject is, however, noticeably different from that in most of the other commercial geographies which have recently appeared.

Part I, an "Introduction to Commercial Geography," covers ninety-two pages, and is devoted to the treatment of wheat, cotton, cattle, iron and coal, and a brief statement of the "Principles of Commercial Geography." The first five of these topics cover the vegetable, animal and mineral products of greatest importance to the American student for whose use the book was primarily prepared. They are so treated as to put him at once into possession of the most significant facts concerning their production, transportation and manufacture. The fact that the people of the United States are greatly interested in all five of these fields of industry makes it possible to base the discussion upon conditions as found in our own country and to draw the illustrations chiefly from United States sources. Foreign countries in which these industries are important are, however, by no means neglected. The chapter on "The Principles of Commercial Geography," although brief, is particularly well placed, as it makes use of the information already obtained concerning the nature and distribution of these important products. The growth of the exchange of products is pointed out, and the constant improvement of transportation and manufacture, as a result of improved standards of living, is noted. The aid and protection which a government seeks to give its people is also commented upon. On the whole

this part forms a most satisfactory introduction to a study of the subject in its details.

Part II is devoted to the "Commercial Geography of the United States." It occupies 186 pages of the text and discusses in order the Plant, Animal and Mineral Industries and the "Water Resources" of our country. This is followed by a consideration of the "Concentration of Industries" and the development of "Centres of General Industry" and the consequent necessity of "Transportation" and "Communication." It closes with a particularly well written and suggestive chapter on "Government and Commerce" and the "Foreign Commerce of the United States." Part II is especially rich in diagrams and illustrations, many of which are new and of great value.

Part III is on the "Commercial Geography of Other Countries." Here the author has avoided the statistical treatment which most books use at this point. Instead, the attention of the student is directed to those countries with which our own maintains close and important commercial relations. Canada is treated first for obvious reasons. This is followed by the "United Kingdom," "France and Belgium," and "The German Empire and the North Sea Countries." In each of these chapters the various topics have been kept in nice balance. The facts in the development of the leading industries have been given enough prominence, so that the student may understand, in part, what the new world owes to the old. The remainder of Europe is treated in two chapters and each of the other continents has a chapter. The book closes with a chapter on "The World's Commerce," which is in part a brief historical review of the development of trade, and in part a statement of the effects of commerce upon society and morals.

The book is beautifully printed and finely and judiciously illustrated.

C. T. MCFARLANE.

Highroads of Geography. The Royal School Series. Book I.—Sunshine and Shower. 128 pp. and ill. 10d.; Book II.—Scouting at Home. 170 pp. and ill. 1s. Thomas Nelson & Sons, London, 1911. 8½ x 6 each.

Simple readers in the elements of geography, designed for beginning pupils. The first book includes lessons in the form of a story framed about a garden in England, in which the water and air at work are studied, followed by descriptions of visits to the mountains and the seashore. The information imparted is given interestingly and clearly and is in general accurate, though an exception must be made to the statement that irregularities in the surface have been made like the wrinkles on a dried-up apple. The illustrations are largely in color and are reproductions of well known masterpieces.

The second book takes up the Boy Scout idea and follows the plan of training children to be scouts, by first presenting in a simple and effective way the meaning and use of maps. This is followed by a series of lessons on the weather, on the erosive processes and the rocks, with a brief treatment of certain industries. The volumes are on an original plan and are well done. They are good, supplementary reading for oral lessons, previous to any use of a text-book.

RICHARD ELWOOD DODGE.

GENERAL

Modern Geography. By Marion I. Newbigin, D.Sc., Editor of the *Scottish Geographical Magazine*. Home University Library of Modern Knowledge, No. 7. 256 pp., maps, diagrams and index. Henry Holt & Co., New York, 1911. 75 cts. 7 x 5.

This book cannot be recommended too strongly to the general reader who wishes to inform himself of the present status of modern geographical science. In nine chapters, to which is added a brief list of standard references, it covers the whole field of geography and points out very clearly what constitutes the distinctive geographic point of view and method. This is accomplished not by an abstract discussion of principles but by an extremely readable presentation of well-chosen examples.

An introductory chapter treats of the beginnings of modern geography, with which the names of Humboldt, Ritter and Darwin are so intimately associated. Two chapters are devoted to the larger features of the relief of the earth's surface and to a discussion of normal and of glacial erosion. The chapter on climate and weather demonstrates the general principles of climatology by means of a characterization of the Mediterranean type. Subsequent chapters on plant and animal geography bring out particularly well the broad aspects of these branches of our subject and afford a welcome relief from the product of writers whose conception of geography still seems to be limited to physiography. A chapter on cultivated plants and domesticated animals leads logically to the discussion of man. Chapter VIII on the races of Europe discusses their present distribution, their origin and the conditions of their environment which have made for differentiation. The final chapter on the distribution of minerals as a potent factor in the localization of industries and in the development of transportation affords an excellent example of the conciseness of statement and the breadth of view characteristic of the book throughout.

The publishers are to be congratulated upon the inception of the series of which this volume forms a part. To judge by the volumes so far published it bids fair to become in English a worthy equal to the well-known "Göschens Sammlung."

W. L. G. J.

Guide to Geographical Books and Appliances. The Second Edition of "Hints to Teachers and Students on the Choice of Geographical Books for Reference and Reading." By H. R. Mill, LL.D., D.Sc., Revised by A. J. Herbertson, J. F. Unstead and Nora E. Macmunn. viii and 207 pp., Published for the Geographical Association by George Philip & Son, Ltd., London, 1910. 5s. 8½ x 5½.

Dr. Mill presented all his rights in his well-known book "Hints to Teachers" to the Geographical Association (Great Britain) on condition that a new edition be produced. This condition has been fulfilled by the preparation and publication of the present work. The plan and most of the contents of the earlier work are reproduced, but the number of works recorded is much longer than in the original book. The object of the volume, as Dr. Mill said in the first edition, "is to place before teachers and students a selection of the best available books on geography as an educational subject, and on different parts of the world." This purpose is admirably carried out and extended in the new edition. While not wholly complete the list is a good teachers' and students' guide to most of

the best books on geography, for reading, study or reference, in English, German and French. There are, however, a number of inaccuracies which should be corrected in the next reprinting.

The Dangers of Municipal Trading. By Robert P. Porter. xiii and 320 pp and index. George Routledge & Sons, Ltd., London, 1907. 7½ x 5.

The book contains the substance of many lectures and addresses delivered by the author before various bodies in England. The facts he gives illustrate the dangers of state or municipal interference with industrial development and the unwisdom of usurpation by public authorities of functions which are better left to private companies and to individual enterprise. The larger part of his data was collected in Great Britain.

Die Indogermanen. (Wissenschaft und Bildung. Einzeldarstellungen aus allen Gebieten des Wissens. Herausgegeben von Privatdozent Dr. Paul Herre). Von Dr. phil. O. Schrader. 165 pp. and illustrations. Verlag von Quelle & Meyer, Leipzig, 1911. Mk. 1.25 7 x 5.

This highly valuable volume, interestingly dealt with throughout, is a reversion to a type of twenty years ago. At that time English students lent their aid to a series of primers of science topics. The defect in the method was that the method of treatment was far too jejune for the needs of specialists trained in each particular subject, and equally far too rich for the use of beginners. The unfortunate result was that students of a not infrequent type studied the primer and not the science, thereby were they able to pass examinations with flying colors and qualify to their own complete satisfaction as leaders of thought without training in the capacity of thinking, with deplorable results which have not yet wholly worn off.

As a primer this small volume is free from the mechanical defect of the earlier type. Of necessity it has been subjected to great condensation, yet it is easy reading and wholly free from the catechetical manner. The moot points are very clearly stated with judicial balance in presentation. It may safely be put in the hands of junior students, always under the inspiration of competent teachers; to more advanced students it will fill an important position as a syllabus of the most recent opinions upon the Aryan family, its language, social complex, life and migration. For the general reader, of course interested in the backward view of his ancestry but scantily tolerant of the arduous detail of special investigation, this volume supplies an excellent conspectus of the most modern views. How fresh and modern it is may be seen from the brief but well-balanced bibliography or short index of collateral reading; with the exceptions of Schrader's *Handelsgeschichte* (1886) and Delbrück's *Verwandtschaftsnamen* (1889), not one of the authorities cited is more than fifteen years old.

WILLIAM CHURCHILL.

Eastern Asia. A History. By Ian C. Hannah, M.A. 327 pp., appendices and index. Frederick A. Stokes Company, New York, 1911. \$2.50. 9 x 5½.

This work is history only in the sense that the monkish chronicles of Europe are history. To compress into a score of chapters the events of three-quarters of that continent where history began and grew old before our race had emerged into the lowest and immemorial barbarism is impossible from the start. The result in this volume partakes rather of the nature of the "quiz" or ready com-

pend whereby matters are made easy for such as find their highest education in passing examinations. We may instance the great figure of Tamerlane, who receives four pages in this narrative. There are dates, some names of places, and that is the sum for one of the great names of history. Taking this work as a mere compend, its value would have been largely increased by footnotes or a bibliography whereby the student might be directed to sources from which he could derive more detailed information.

Our estimate of the purpose of this work as a feeder to examinations is confirmed by the author's preface, in which he sets forth that in the ten years which have elapsed since the first edition much lecturing on the subject for university extension has given him, he trusts, a better grip of the subject. Dealing with peripheral phenomena, for it is only on the edges of his eastern Asia that history has been preserved in dated records, he is forced to pursue several threads, each for a certain space and then to wait until the other threads are drawn out to equal length before he can resume each earlier thread. The result is the appearance of lack of continuity. Yet here, as wherever men live, history is continuous, it has continued here longer from the remote past than elsewhere on the world. A great change of direction marks the modern from the former epochs of Asian history. The newer impulse to the history of the great home continent is centripetal; Europe comes to Asia by water and from the shore seeks the inner empires. But the ancient impulse was centrifugal; from the inner deserts ever swarmed fresh hordes of brute barbarians seeking with destructive avidity to enjoy the delights of culture. When we write European history the beginning of the present is in a past ravaged by the Goth and the Varangian, and beginning with them we obtain a consistent picture. Whether compend or history, the story of eastern Asia, likewise, must be written from within outward if we are at all to have a connected narrative. This work will have its field of usefulness; from its index the inquirer will find it easy to discover such memorable facts concerning the larger figures of Asiatic life as will satisfy most inquiry.

WILLIAM CHURCHILL.

The Book of the English Oak. By Charles Hurst. 196 pp., map, 14 illustrations and index. Lynwood & Co., Ltd., London, 1911. 5d. $7\frac{1}{2} \times 5$.

The author has found much of interest to say about the English oak. It would scarcely be expected that a whole book could be filled with the oak tree; but the oak has many moods, conditions and aspects, and the author has found many sides of it to tell about. He treats its traditions, its place in poetry and shows how every Englishman may enrich his country by cultivating the oak and thus perpetuating one of the most characteristic features of the English landscape.

Coral and Atolls. Their History, Description, Theories of Their Origin both Before and Since that of Darwin, the Influence of Winds, Tides and Ocean Currents on Their Formation and Transformations, Their Present Conditions, Products, Fauna and Flora. By F. Wood-Jones, B.Sc. xxiii and 392 pp., map, illustrations, bibliography, appendices and index. Lovell, Reeve & Co., Ltd., London, 1910. 24s. $9 \times 6\frac{1}{2}$.

The title conceals the fact that this volume contains a most interesting account of the kings of Cocos-Keeling, a topic that cannot fail of attracting attention. The adventure side of geography has had its great share in the upbuild-

ing of the science. There has never been lack of brave men who have gone to the edge of things to carve out kingdoms for themselves. In these waters of the Indo-Pacific three come readily to mind: Greig of Fanning Island, Brooke of Sarawak, Clunies-Ross of Cocos. It is but among the yesterdays that Greig sold Fanning to a commercial company and relinquished a dream which, after all, is mediæval in its conception. Sarawak under the second of the Brookes has fallen into place as one of the sovereign lands of the earth. Yet older is the kingdom of Cocos-Keeling, for the third Ross now wields the kindly authority of his ancestors. It is a fine tale of brave deeds, a pity that there is no word to show that this is in the contents of the book.

Cocos possesses singular interest for every student of the contribution of the corals to land formation. It is the type specimen which underlies all of Darwin's theory of subsidence, the only atoll which he ever had the opportunity to examine. But Darwin knew Cocos for only ten days and sailed away; Dr. Wood-Jones spent fifteen months in the daily study of the growth of Cocos through the accretion and destruction of its corals.

He begins his series of valuable studies by an examination of the life history of the minute unit, the zoöid, which is the agent in this great structural geography. At the outset he renders a great service by his proof that the nomenclature of the corals is wholly misleading, because the systematic biologists have been misled by differences in the stony remains found in museum cabinets which are not characteristic of specific differences. He is very careful to point out that the zoöid is peculiarly susceptible to the external influences of its habitat, both in the individual coral colony and in the lagoon or outer reef conditions in which it must live. He avers, and it carries conviction, that the variety in the stony remnant of that which was once alive records conditions of environment, not such structural difference as may serve for the foundation of species. His observations tend to strengthen the genera under observation, to show how needlessly and how improperly the synonymy is overloaded with untenable species.

In his study of the individual zoöid he introduces that factor which he develops more and more into the explanation of reef formation, the effect of sedimentation. In the story of the zoöid he makes it clear that it is the heaping up of a few grains of sand upon the soft tissues which kills the animal. Passing to the next higher unit he carries along to each of the important genera of lagoon and reef corals the study of the effect of this depositing of foreign material. He has made such excellent use of the *Porites* that we may follow his discussion along toward the valuable conclusions at which he addresses it. The colony of *Porites* tends to form a spherical mass not at first attached to the base upon which it grows or by no more than a pedicel. As the colony increases by growth the lower zoöids have to bear the weight of the superincumbent mass and are at the same time suffocated by being forced down upon the sand or rock on which they rest. The death of these individuals tends toward the deformation of the colony toward the dome, or half-sphere, shape. The summit zoöids are equally imperilled by the conditions of their life, the silt carried by the water is deposited on the colony, on the sloping edges it is cleared by the activity of the zoöid, falls by gravity or is scoured by the water movement. But on the summit of the dome the sediment remains, the zoöids die and deformation follows. In the end the classic type of the *Porites* colony reproduces the type of the atollon, as that is a miniature of the completed atoll.

The theory is most ingeniously elaborated. The author discusses the warring theories as point by point they arise for consideration; but it is rather discussion *ex laguna* than discussion *ex cathedra*. Does a point need attention, he takes us at once to the waters and shows us just what processes of nature are now operative. It is a most attractive method and should lead to a better comprehension of this great factor in land formation. WILLIAM CHURCHILL.

Im Ballon über die Jungfrau nach Italien. Naturaufnahmen aus dem Freiballon. Von Gebhard A. Guyer. Mit einem Anhang, Himmelfahrt traversierung der Alpen im Ballon "Cognac" von Konrad Falke. 45 pp., map and illustrations. Gustav Braunbeck & Gutenberg—Druckerei Aktiengesellschaft, Berlin, 1910. 10 x 7.

A series of forty-eight engravings of photographs taken in the upper air from a balloon above the Alps. Most of them are fine specimens of photography, with wonderful cloud effects, showing the aspects of the upper parts of the mountains with névé fields above which the peaks arise. A brief description of each view is given. The book concludes with the story of Mr. Falke's air journey across the Alps.

Le Grandi Comunicazioni, di Terra e di Mare. By Capt. Luigi Giannitràpani. vi and 214 pp., maps, appendices and index. Nicola Zanichelli, Bologna, 1911. 6½ x 4½.

An excellent study of modern means of communication by land and sea in all parts of the world. The treatment in so small a volume is necessarily condensed, but the essentials are given. The work is illustrated by three maps well produced by the Istituto Geografico de Agostini-Novara.

How to Use Contour Handmaps for Class Teaching. Suggestions for Practical Exercises with Coloured Facsimile. By J. A. White. 8 pp. and maps. George Philip & Son, Ltd., London, 1911. 6d. 8½ x 5½.

The purpose is to show how contoured hand maps may be used to acquire a sound knowledge of the geography of a region in a series of class-room exercises. A contour map of Scotland is employed to illustrate some phases of the method advocated.

Historia de las Guerras Civiles del Perú (1544-1548), y de Otros Sucesos de las Indias. Por Pedro Gutiérrez de Santa Clara. Tomo Cuarto. 571 pp. and index. Librería General de Victoriano Suárez, Madrid, 1910. 10s. 6d. 8 x 5.

This fourth volume of the historical chronicle, the first three volumes of which have already been reviewed in the *Bulletin*, does not call for any extended mention. It is a pure chronicle of events, highly important for an intimate knowledge of the troubled time immediately preceding the complete restoration of royal authority in Perú by Pedro de la Gasca. For so-called political geography it affords interest through the mention of places, water-courses and the like, as any other chronicle would, but there is less descriptive geography in it than in the preceding volumes. There is much analogy with the third part of Cieza de Leon, as far as the latter is known.

AD. F. BANDELIER.

The Inquisition in the Spanish Dependencies. Sicily-Naples-Sardinia-Milan-The Canaries-Mexico-Peru-New Granada. By Henry Charles Lea, LL.D., S.T.D. xvi and 564 pp. and index. The Macmillan Co., New York, 1908. \$2.25. 9 x 6½.

A comparatively brief sketch of a lengthy and complicated question, based largely upon the material furnished by José Toribio Medina, a highly respectable fountain of knowledge. A critical review of the book lies entirely outside the scope of this *Bulletin*. The work has attracted deserved attention and has, therefore, been abundantly reviewed.

AD. F. BANDELIER.

Imperial Telegraphic Communication. By Charles Bright, F.R.S.E. xxiv and 212 pp., map and index. P. S. King & Son, London, 1911. 7½ x 5.

Treats of the development of the telegraph and cable service in the British Empire and is in some sort a history of the movement for extended and cheaper telegraphy. The appendix gives a table of charges for foreign and colonial telegrams from any part of the United Kingdom.

Plant-Animals. Study in Symbiosis. By Frederick Keeble, Sc.D. viii and 163 pp., illustrations, bibliography and Index. University Press, Cambridge, 1910. 40 cents. 6½ x 5.

This is one of the "Cambridge Manuals of Science and Literature." While Dr. Keeble was working in a small marine laboratory in Brittany, visitors often asked him to explain his purposes in going to and fro along the shore, wading among the sea weeds "and bringing into the laboratory minute, worm-like, animals which represented often my sole catch." Many of the visitors became interested in the work and the numerous questions they asked suggested this little volume. He has written it *con amore*, tells of many striking phenomena and few readers can fail to be interested in these pages.

La Haute-Loire et le Haut-Vivarais. Guide du Touriste, du Naturaliste et de l'Archéologue. Par Marcellin Boule. viii and 366 pp., map, illustrations and index. Masson et Cie, Paris, 1911. Fr. 4 50. 7 x 4½.

This volume completes the small series by Mr. Boule on the central volcanic massif of France. All intelligent persons visiting the regions described will find that the large variety of information presented will add much to the pleasure and the profit of their journey.

CURRENT GEOGRAPHICAL PAPERS

NORTH AMERICA

United States

BANCROFT, HOWLAND. Reconnaissance of the Ore Deposits in Northern Yuma Co., Arizona. *Bull.* 451, U. S. Geol. Surv., 130 pp., Maps, Ills., Diagrams, Geol. Sections and Index, 1911.

BRIGHAM, ALBERT PERRY. The Distribution of Population in the United States. (Abstract). *Compte Rendu des Travaux du Congrès, Neuvième Congrès Intern. de Géogr.*, Tome III, pp. 72-76, Genève, 1911.

- CHAMBERLAIN, ALLEN. Present Forest Problems of Massachusetts. Ills. *Amer. Forestry*, Vol. XVII, No. 7, 1911, pp. 389-395, Washington, D. C.
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NEW MAPS

EDITED BY THE ASSISTANT EDITOR

System Followed in Listing Maps.

Title. As on original, if possible. If lacking or incomplete, necessary matter enclosed in brackets.

Scale. Natural (unless otherwise on original), followed by equivalent in miles to one inch. If no scale on original, approximate scale enclosed in brackets.

Coordinates. Approximate limiting coordinates of map given. Where map-net lacking, coordinates, if possible of determination, given in brackets. All meridians referred to Greenwich. If map not oriented N., orientation given.

Colors. Number of tints of separate symbols, not number of color printings given. Black or basal color not considered a color.

Source. If map separately published, name of institution issuing it, place and date given. If a supplement, title of paper or book, author, periodical, volume, pages and year given.

Comment. Descriptive and critical. In brackets.

Regional Classification. Major political divisions the unit, as a rule, except for United States and Canada. Boundaries of continents according to Siever's *Länderkunde*, Kleine Ausgabe.

MAPS ISSUED BY UNITED STATES GOVERNMENT BUREAUS

U. S. GEOLOGICAL SURVEY

Maps Accompanying Publications

ALASKA. Map Showing Relation of Alaska Coal Fields to Transportation Routes. [1:11,200,000 approx. (1 in. = 176.3 miles approx.).] 72° - 52' N.; 178° - 126° W. Accompanies, as Pl. I, facing p. 52, "Alaska Coal and Its Utilization," by A. H. Brooks, *Bull.* 442-J (extract from *Bull.* 442), 1911.

[Valuable map showing areas known to contain workable coals and coal-bearing rocks; location of mountain axes, rivers navigable in summer and limits of sea ice in winter. For similar delineation of mountain axes see map facing p. 178, *Bull. Amer. Geogr. Soc.*, Vol. 42, 1910.]

COLORADO. (a) Map showing approximate distribution of the principal silver, lead and gold regions in Colorado. After Spurr. [1:3,350,000 approx. (1 in. = 54.9 miles approx.).] 41° - 37° N.; 109½° - 101½° W.

(b) Outline Map of the Region Adjacent to Breckenridge, Colo. 1:250,000 (1 in.=3.95 miles). [39°42' - 39°15' N.; 106°22' - 105°44' W.].

(c) Geologic Map of the Breckenridge District, Colorado. Geology by F. L. Ransome and E. S. Bastin. Surveyed in 1909-11. 1:24,000 (1 in.=0.38 mile). 39°33' - 39°27' N.; 106°4' - 105°56.8' W. 15 colors.

(d) Map Showing Topography and Mining Claims in the Breckenridge District, Colorado. Surveyed in 1908. Contour interval 50 ft. Same scale and coordinates as map (c). 3 colors.

Accompany, as Fig. 1 on p. 14, Pl. III facing p. 16 and Pls. I and II in pocket, "Geology and Ore Deposits of the Breckenridge District, Colorado" by F. L. Ransome, *Prof. Paper* 75, 1911.

NEW MEXICO. (a) Map showing location of Estancia, Encino and Pinos Wells basins. [1:4,000,000 approx. (1 in.=63.1 miles approx.)]. 35½° - 33½° N.; 107° - 102½° W.

(b) Map of Estancia Valley, New Mexico, Showing Physiography and Pleistocene and Recent Geology. 1:375,000 (1 in.=59.18 miles). [35°25' - 34°20' N.; 106°30' - 105°40' W.]. 5 colors.

(c) Map of Estancia Valley, New Mexico, Showing Depth to and Quality of the Ground Waters. Same scale and coordinates as map (b). 6 colors.

(d) Reconnaissance Geologic Map of the Ancient Lake Bed in the Encino Basin, New Mexico. 1 in.=1½ miles (1:95,040). [34°40' N. and 105°25' W.]. With geologic section. 6 colors.

Accompany, as Fig. 1 on p. 7, Pl. I facing p. 7, Pl. XI facing p. 38 and Pl. XII facing p. 76, "Geology and Water Resources of Estancia Valley, New Mexico, etc." by O. E. Meinzer, *Water-Supply Paper* 275, 1911.

VIRGINIA. Map Showing Economic Geology of Richmond, Va., and Vicinity. By N. H. Darton. 1:62,500 (1 in.=0.99 mile). 37°37.0' - 37°28.6' N.; 77°32' - 77°21' W. 8 colors. With geological section. Accompanies, as Pl. I facing p. 6, "Economic Geology of Richmond, Virginia, and Vicinity" by N. H. Darton, *Bull.* 483, 1911.

NORTH AMERICA

ALASKA. Physical Map of Alaska. [1:12,200,000 approx. (1 in.=192.6 miles approx.)]. No map-net. 12 colors. Accompanies, as separate plate facing p. 36, "The Ice Age in North America" (5th edition) by G. F. Wright, Oberlin, O., 1911.

[Land relief expressed in five tints and mountain hachuring, the latter primitive. Orthography of names obsolete].

CANADA AND UNITED STATES. Map Showing, in Dotted Lines, the Preglacial Drainage in the Basin of the Lower Great Lakes. Corrected, according to the latest information, by Professor J. W. Spencer. [1:4,000,000 approx. (1 in.=63.1 miles approx.)]. [46° - 41° N.; 85½° - 76° W.]. Accompanies, as separate plate facing p. 312, "The Ice Age in North America" (5th edition) by G. F. Wright, Oberlin, O., 1911.

CANADA AND UNITED STATES. Map of the Glacial Lake Agassiz showing its relation to Hudson Bay and the Great Lakes. By Warren Upham, D. Sc. [1:14,200,000 approx. (1 in.=224.2 miles approx.)]. 58° - 44° N.; 114° - 76° W. Accompanies, as separate plate facing p. 401, "The Ice Age in North America" (5th edition) by G. F. Wright, Oberlin, O., 1911.

NORTH AMERICA. Map of North America showing interlapping late Black River and early Trenton Invasions from the Arctic, Atlantic, Gulf of Mexico and Pacific Sides. [1:70,000,000 approx. (1 in.=1105 miles approx.)]. No map-net. Accompanies, as Fig. 7 on p. 368, "Revision of the Paleozoic Systems" by E. G. Ulrich, *Bull. Geol. Soc. Amer.*, Vol. 22, pp. 281-680, 1911.

UNITED STATES AND CANADA. Map Showing the Glacial Geology of the United States and Canada. [1:22,000,000 approx. (1 in.=347.3 miles approx.)]. 54° - 25° N.; 130° - 65° W. Accompanies, as separate plate facing p. 202, "The Ice Age in North America" (5th edition) by G. F. Wright, Oberlin, O., 1911.

[Shows southern limit of ice-sheet and drift, terminal moraines, courses of glacial striae, mountain areas of local glaciation, Driftless Area of Wisconsin, modified drift in valleys of southward drainage from the ice-sheet, boundaries of glacial lakes.]

UNITED STATES

CONNECTICUT. Preliminary Geological Map of Connecticut by H. E. Gregory and H. H. Robinson. 1906. 1:250,000 (1 in.=39.45 miles). 41 colors. Accompanies pamphlet with same title by same authors, *Bull. No. 7*, Connecticut Geological and Natural History Survey, 1907.

[The standard general geological map of the state.]

EASTERN UNITED STATES. (a) Map of the Southern Appalachian Valley Showing Outcrops of Ordovician Rocks. [1:2,000,000 (1 in.=31.6 miles approx.)]. Oriented N. 36° E. 38° - 34° N.; 85°30' - 80°15' W.

(b) Sketch Map of southeastern North America Showing Appalachian troughs and principal lines along which stratigraphic overlaps are common. [1:28,500,000 approx. (1 in.=450.6 miles approx.)]. 53° - 28° N.; 102° - 55° W.

Accompany, as Pl. 25 (frontisp.) and as Fig. 1 on p. 203, "Revision of the Paleozoic Systems" by E. O. Ulrich, *Bull. Geol. Soc. Amer.*, Vol. 22, pp. 281-680, 1911.

FLORIDA. Geologic Map of North-Central Part of Florida Suggesting oscillation of the Ocala dome. From map published by Florida State Geological Survey, 1909. [1:2,200,000 (1 in.=34.7 miles approx.)]. Scale incorrectly given as 1:1,000,000. 30°35' - 27°25' N.; 83°45' - 81°0' W. Accompanies, as Fig. 13, on p. 431, "Revision of the Paleozoic Systems" by E. O. Ulrich, *Bull. Geol. Soc. Amer.*, Vol. 22, pp. 281-680, 1911.

MAINE. The Kames of Maine and southeastern New Hampshire. [1:4,200,000 approx. (1 in.=66.3 miles approx.)]. [47° - 42½° N.; 71½° - 67° W.]. Accompanies, as Fig. 104 on p. 344, "The Ice Age in North America" (5th edition) by G. F. Wright, Oberlin, O., 1911.

MINNESOTA. Map showing the stages of recession of the ice in Minnesota. (Upham). [1:6,200,000 approx. (1 in.=97.9 miles approx.)]. 49° - 43½° N.; 97° - 90° W. Accompanies, as Fig. 181 on p. 662, "The Ice Age in North America" (5th edition) by G. F. Wright, Oberlin, O., 1911.

NEW YORK. Map of western New York, showing distribution of morainal deposits. (From U. S. Geological Survey). [1:3,600,000 approx. (1 in.=56.8 miles approx.)]. [43°30' - 41°20' N.; 80° - 75° W.]. Accompanies, as Fig. 65 on p. 206, "The Ice Age in North America" (5th edition) by G. F. Wright, Oberlin, O., 1911.

NEW YORK. Free Public Educational Institutions of the City of New York in the Year 1911. Prepared by the Department of Public Education of the American Museum of Natural History. [1:54,000 approx. (1 in.=0.85 miles approx.).] Oriented N. 30° W. [40°55' - 40°33' N.; 74°12' - 72°45' W.]. 5 colors.

[Shows location of museums, public schools, high schools, corporate schools, public libraries and lines of transportation].

NORTH AND SOUTH DAKOTA. Sketch Map of the Missouri Coteau and its Moraines. By J. E. Todd, Asst. Geologist, U. S. G. S. [1:4,000,000 approx. (1 in.=63.1 miles approx.).] 48½° - 42½° N.; 101¾° - 97° W. Accompanies, as Fig. 67 on p. 216, "The Ice Ages in North America" (5th edition) by G. F. Wright, Oberlin, O., 1911.

UNITED STATES. [Two maps:] U. S. A. Census of 1900. (a) Map showing the increase per cent. of the population of each State between 1890 and 1900. (b) Map showing the increase per cent. of the population of each State between 1900 and 1910. 1:50,000,000, or 1 in.=789.13 miles. Accompany, on p. 403, "Some Recent Census Returns" (first part) by O. J. R. Howarth, *Geogr. Journ.*, Vol. 38, pp. 396-404, 1911.

CANADA

BRITISH COLUMBIA. [Map of Vancouver Island]. [1:2,000,000 approx. (1 in.=34.7 miles approx.).] On back cover of "Vancouver Island . . . A History of its Resources by Districts" compiled by The Vancouver Island Development League, Victoria, B. C.

[Shows railroads and ferries in existence, those authorized or under construction and those contemplated. Gives ocean distances from Victoria to principal ports of the world.]

CANADA. Resource Map of the Dominion of Canada. 1911. 1:12,300,000, or 197.3 miles to 1 in. 73° - 40° N.; 150° - 35° W. 5 colors. Accompanies "Statistics of the Dominion of Canada," Dept. of the Interior, Ottawa, 1911.

[Indicates location of principal raw products by their names printed in red. Coal fields and collieries shown.]

CANADA. Index map to Sheets of 1 Inch to 1 Mile & ½ Inch to 1 Mile Maps of Canada Published by Department of Militia and Defence. Geographical Section, General Staff, No. 2278. Index Map No. 12. Revised to Jan'y, 1911. [1 inch=40 miles (1:2,534,400)]. 47½° - 41½° N.; 85° - 70° W. 6 colors.

[Shows areas surveyed and sheets published. The regions so far covered by this survey are the southern half of the Interlake Peninsula of Ontario and the St. Lawrence Lowland from Ottawa and Kingston to below Montreal. These maps are very similar in quality to the topographic sheets of the U. S. G. S. and superior to them in that woods are represented on all sheets. The price of the sheets 1:63,360 is 50 cts., that of the sheets 1:126,720, 60 cts. apiece.]

SOUTH AMERICA

ARGENTINA-CHILE. Demarcación de Límites con Chile. 6a Sub-Comisión. Region de la Puna. Mapa Preliminar. Z. Sánchez. T. Loos. Julio de 1898. 1:200,000 (1 in.=3.16 miles). 24°40' - 27°27' S.; 66°20' - 67°10' W. Accompanies, facing p. 102, "Frontera Argentino Chileno. Informe del Jefe de la 6a Sub-Comisión de Límites con Chile. 1898. Informe No. 15. (Conclusión)," *Bol. Inst. Geogr. Argentino*, Vol. 25, pp. 82-103, 1911.

[Valuable large-scale map embracing the intermont plateau of the Puna de Atacama. Sketch contours.]

BRAZIL. (a) A Portion of Brazil showing relative position of Diamond fields. Reproduced from "Journal of the Royal Society of Arts," with additions by David Draper. [1:11,000,000 approx. (1 in.=173.6 miles approx.).] 11° - 24° S.; 58° - 38° W.

(b) [Geomorphologic] Map of Bagagem Valley. No scale. [19° S. and 48° W.]. Accompany, as Pls. III and IV, "The Diamond-Bearing Deposits of Bagagem and Agua Suja in the State of Minas Geraes, Brazil" by D. Draper, *Trans. Geol. Soc. South Africa*, Vol. 14, pp. 8-19, 1911.

BRAZIL. Planta do Littoral de S. Sebastião e do Rio Juquiquerê. 1:50,000 (1 in.=0.79 mile). 23°37' - 23°48' S.; 45°40' - 45°19' W. 2 colors. Accompanies "Exploração do Rio Juquiquerê [sic]," *Comm. Geogr. e Geol. do Estado de S. Paulo*, 1911.

[One of the excellent exploratory surveys along river courses which is covering the state of São Paulo with a net-work of surveyed lines.]

COLOMBIA. Peninsula de la Guajira [Guajira] por F. A. A. Simons. [1 in.=15 miles (1:950,400)]. 12°30' - 10°46' N.; 73° - 71° W. 1 color. Accompanies, facing p. 404, "Los Indios Guajiros" (first part), translated from the English of F. A. A. Simons by A. Ernst, *Rev. Tecn. Minist. Obr. Publ.* (Caracas, Venezuela), Vol. 1, pp. 403-408, 1911.

[Taken from a report on an exploration made for the Colombian Government in 1883-84, published in the *Anales de la Instrucción Pública de Colombia*.]

VENEZUELA. Croquis de los caminos de recuas entre Santa Lucia, Caucagua y Guatire. 1:150,000 (1 in.=2.37 miles). [10°30' - 10°10' N.; 66°50' - 66°25' W.] Accompanies, facing p. 392, report on "Camino entre Boca de Siquire, Caucagua y Guatire" by M. L. Quintero, *Rev. Tecn. Minist. Obr. Publ.* (Caracas), Vol. 1, pp. 390-393, 1911.

AFRICA

CENTRAL AFRICA. Route of the Expedition [of the Duke of Mecklenburg, 1907-08]. 1:7,500,000 (1 in.=118.37 miles). 6° N. - 6° S.; 12° - 42° E. 2 colors. Accompanies "In the Heart of Africa" by Duke Adolphus Frederick of Mecklenburg, London, New York, etc., 1910.

EASTERN SAHARA. Sahara Orientale. [1:24,400,000 approx. (1 in.=385.1 miles approx.).] [38° - 7° N.; 6° - 36° E.]. Accompanies, on p. 323, "Les Turcs en Afrique Centrale: La Frontière Franco-Tripolitaine" by M. Cortier, *L'Afrique Franç.*, Vol. 21, pp. 320-328, 1911.

[Shows Franco-Tripolitan boundary, caravan routes and uninhabitable deserts.]

FRENCH GUINEA. (a) Schéma des Sources du Niger et du pays Toma. [1:9,900,000 approx. (1 in.=142.0 miles approx.)]. [13 2/5° - 7° N.; 12° - 5½° W.].

(b) Projet de délimitation en 1906 [between French Guinea and Liberia]. [1:7,100,000 approx. (1 in.=112.1 miles approx.)]. [9° - 7° N.; 11° - 8½° W.].

(c) Carte du Pays Toma. Dressée d'après les travaux de M. le Lieut. Bouet, des Officiers du Secteur Militaire et de la Mission de Délimitation. [1:950,000 approx. (1 in.=15.0 miles approx.)]. $9^{\circ}8' - 7^{\circ}36' N.$; $9^{\circ}55' - 8^{\circ}40' W.$

(d) Frontière Franco-Libérienne. [1:6,800,000 approx. (1 in.=107.3 miles approx.)]. $9\frac{1}{2}^{\circ} - 4^{\circ} N.$; $11\frac{1}{2}^{\circ} - 6\frac{1}{2}^{\circ} W.$

Accompany, on pp. 187, 188, 189 and 191, "Les Tomas" (first part) by F. Bouet, *Rens. Colon.*, No. 8, pp. 185-200, 1911.

[Map (c) a valuable map on a relatively large scale embodying original material.]

GERMAN AND BRITISH EAST AFRICA. Allgemeine Übersichtsskizze der Wohngebiete des Masai-volkes. 1:3,000,000 (1 in.=47.34 miles). $3\frac{3}{5}^{\circ} N. - 6\frac{1}{2}^{\circ} S.$; $33\frac{1}{2}^{\circ} - 40\frac{1}{2}^{\circ} E.$ 3 colors. Accompanies "Die Masai" by M. Merker, Berlin, 1910.

[Shows extent of steppe lands and approximate boundaries of Masai provinces.]

GERMAN AND BRITISH EAST AFRICA-BELGIAN CONGO. The [Duke of Mecklenburg's] Expedition's field of work. Prepared by Lieut. M. Weiss. 1:2,000,000 (1 in.=31.56 miles). $2^{\circ} N. - 6^{\circ} S.$; $24^{\circ} - 32^{\circ} E.$ With inset: The Volcanic district. 1:600,000 (1 in.=9.46 miles). [$1^{\circ}10' - 1^{\circ}50' S.$; $29^{\circ}0' - 29^{\circ}50' E.$]. 3 colors. Accompanies "In the Heart of Africa" by Duke Adolphus Frederick of Mecklenburg, London, New York, etc., 1910.

[Valuable original material on the region drained by the Kagera source of the Nile and the volcanic region N.E. of Lake Kivu.]

GERMAN EAST AFRICA. (a) Skizze von Daressalam mit den in den Jahren 1901-05 von Brandes, Koert, und Tornau ausgeführten Bohrungen. 1:20,000 (1 in.=0.32 mile). [$6^{\circ}50' S.$ and $39^{\circ}15' E.$]. (b) Skizze von Tanga mit den von Koert 1902-03 ausgeführten Wasserbohrungen. 1:15,000 (1 in.=0.24 mile). [$5^{\circ}5' S.$ and $39^{\circ}10' E.$].

Accompany, as Taf. 1 and Taf. 3, "Zur Geologie und Hydrologie von Daressalam und Tanga (Deutsch-Ostafrika)" by W. Koert and F. Tornau, *Abhandl. königl. Preussischen Geol. Landesanstalt*, Neue Folge, Heft 63, Berlin, 1910.

GERMAN SOUTH-WEST AFRICA. Farm-Übersichtskarte von dem Bezirk Gibeon und dem Distrikt Maltahöhe. Bearbeitet und gezeichnet im Bureau der kaiserlichen Landesvermessung in Windhuk durch den Topograph Karsunke. Nov. 1910. In 2 sheets. 1:200,000 (1 in.=3.16 miles). $23^{\circ}57' - 25^{\circ}50' S.$; $15^{\circ}53' - 18^{\circ}20' E.$ 3 colors. Accompanies, as Taf. 6, *Mitt. aus den Deutschen Schutzgeb.*, Vol. 24, No. 4, 1911.

[Excellent large-scale map showing generalized contours in brown, drainage in blue, farm boundaries in green.]

KAMERUN. Karte zu: Mann, Stand der geologischen Erforschung des Schutzgebietes Kamerun. 1:5,000,000 (1 in.=78.91 miles). $13^{\circ} - 1\frac{1}{2}^{\circ} N.$; $6\frac{1}{4}^{\circ} - 17\frac{1}{4}^{\circ} E.$ 1 color. With two insets: (1) Buca und Umgegend. 1:2,500,000 (1 in.=39.45 miles). $4^{\circ}50' - 3^{\circ}5' N.$; $8^{\circ}27' - 10^{\circ}20' E.$ (2) [Map of Baden on same scale as main map for comparison]. Accompanies "Bericht über den Stand der geologischen Erforschung von Kamerun im Mai 1910" by O. Mann, *Mitt. aus den Deutschen Schutzgeb.*, Vol. 24, pp. 203-218, 1911.

[Shows, in red, Dr. Mann's route and the location of mineral deposits.]

RHODESIA. Sketch Map of the South-East corner of the Bangweulu Swamps inhabited by the Wa-Unga showing the channels connecting the Chambeshi and Luapula Rivers as traced during twelve journeys by boat and canoe, 1902-1910, by Frank H. Melland. 1:500,000, or 1 in.=7.89 miles. $11^{\circ}0' - 12^{\circ}2' S.$; $29^{\circ}15' - 31^{\circ}15' E.$ 1 color. With inset, 1:25,000,000, showing general location of main map. Accompanies "Bangweulu Swamps and the Wa-Unga" by F. H. Melland, *Geogr. Journ.*, Vol. 38, pp. 381-395, 1911.

[Valuable original map.]

SUDAN. Schéma du Massalit et itinéraires de la Compagnie Arnaud d'après les levés des lieutenants Delacommune, Thérail, Jourdy, Béraud, etc. [1:930,000 approx. (1 in.=14.7 miles approx.)]. [$14\frac{1}{2}^{\circ} - 13^{\circ} N.$; $21^{\circ} - 23^{\circ} E.$]. With inset map showing general location. Accompanies, on p. 28r, "Données Géologiques sur le Ouadai et les Pays Limitrophes" by P. Lemoine, *L'Afrique Franç.*, Vol. 21, pp. 280-283, 1911.

TRANSVAAL. Sketch Map showing the approximate positions of the Kimberlite occurrences in the Pretoria District. [1 in.=4 miles (1:253,440). Scale incorrectly given.]. [$24^{\circ}37' - 24^{\circ}55' S.$; $28^{\circ}15' - 28^{\circ}43' E.$]. Accompanies, as Fig. 1 on p. 44, "Petrographical Notes on the Kimberlite Occurrences in the Pretoria District" by P. A. Wagner, *Trans. Geol. Soc. South Africa*, Vol. 14, pp. 43-63, 1911.

TRANSVAAL. [Geological Map of a portion of the Lower Witwatersrand System on the Central Rand.]. [1:60,000 approx. (1 in.=0.95 mile approx.)]. [$26^{\circ}15' S.$ and $58^{\circ} E.$]. Accompanies, as Pl. X, "Some Structural Features of the Witwatersrand System on the Central Rand, with a Note on the Rietfontein Series" by E. T. Mellor, *Trans. Geol. Soc. South Africa*, Vol. 14, pp. 24-42, 1911.

WESTERN AFRICA. Le Chemin de Fer de Guinée et ses Rapports Économiques avec le Cours du Niger. [1:21,300,000 approx. (1 in.=336.2 miles approx.)]. $21^{\circ} - 3^{\circ} N.$; $18^{\circ} W. - 13^{\circ} E.$ Accompanies note with similar title, *Tour du Monde*, Vol. 17, pp. 253-254, 1911.

ASIA

CEYLON. [Map of] Ceylon. [1:1,000,000 approx. (1 in.=15.8 miles approx.)]. $10^{\circ} - 5\frac{1}{4}^{\circ} S.$; $79\frac{1}{4}^{\circ} - 82^{\circ} E.$ Accompanies, in pocket, "The Veddas" by C. G. and B. Z. Seligman, Cambridge (England), 1911.

[Nomenclature especially full in Vedda country of east-central Ceylon.]

FRENCH INDO-CHINA. (a) Indochine Française. Carte Physique. 1:6,000,000 (1 in.=94.69 miles). $23\frac{1}{2}^{\circ} - 8^{\circ} N.$; $100^{\circ} - 110\frac{1}{2}^{\circ} E.$ 5 colors.

(b) Indochine Française. Carte Économique et Administrative. Same scale and coordinates as map (a). 2 colors.

(c) Cochinchine [Carte Physique]. 1:2,500,000 (1 in.=39.45 miles). $12^{\circ}10' - 8^{\circ}20' N.$; $103^{\circ}10' - 107^{\circ}55' E.$ 5 colors.

(d) Tonkin [Carte Physique]. 1:2,500,000. [$23^{\circ}35' - 19^{\circ}40' N.$; $101^{\circ}55' - 108^{\circ}20' E.$]. 6 colors.

Accompany, as Planches I-IV, "L'Indo-Chine française" by H. Russier and H. Brenier, Paris, 1911.

[Maps (a), (c) and (d) are good general physical maps showing relief in four or five tints, ranging from green through yellow to brown. Map (b) shows distribution of products, railroads and navigable rivers.]

INDIA. Kashmir. Sketch Maps to illustrate the explorations of Dr. A. Neve in the Himalayas, 1896-1910. 1:250,000, or 1 in.=3.94 miles. 3 colors. No. I. $34^{\circ}8' - 33^{\circ}50' N.$; $75^{\circ}42' - 76^{\circ}13' E.$ No. II. $35^{\circ}9' - 34^{\circ}46' N.$; $77^{\circ}27' - 77^{\circ}49' E.$

With two insets: (1) [Map of Kashmir showing Dr. A. Neve's route and location of maps Nos. I and II]. 1:2,000,000, or 1 in.=31.56 miles. $36^{\circ}35' - 33^{\circ}25' N.$; $75^{\circ}12' - 78^{\circ}25' E.$ 2 colors. (2) [Map of northern India showing general location of maps I and II]. 1:30,000,000 (1 in.=473.48 miles). 2 colors.

Accompany "Journeys in the Himalayas and Some Factors of Himalayan Erosion" by A. Neve, *Geogr. Journ.*, Vol. 38, pp. 345-362, 1911.

[Valuable original material on the Karakorams and the Himalayas on both sides of the upper Indus.]

PHILIPPINE ISLANDS. Sketch Map of the Taal Volcano Region. [1:103,000 approx. (1 in.=3.1 miles approx.)]. $14^{\circ} N.$ and $121^{\circ} E.$. Accompanies, as Pl. I facing p. 6, "The Eruption of Taal Volcano, January 30, 1911" (in English and Spanish) by M. S. Maso, Weather Bureau, Manila, 1911.

TURKEY IN ASIA. Map Showing Miss Gertrude Bell's Route from Aleppo to Konia. [1 in.=34 miles (1:12,154,240)]. $39^{\circ} - 32^{\circ}3' N.$; $32^{\circ} - 45^{\circ}12' E.$ 2 colors. Accompanies "Amurath to Amurath" by Gertrude L. Bell, New York, 1911.

AUSTRALIA AND OCEANIA

DUTCH NEW GUINEA. Schetskaart van het Sentani-Meer, Noord Nieuw-Guinea, door Kapn. F. J. P. Sachse, Febr. 1911. Aangevuld met de opnemng van de Koimé-rivier door luit. der inf. J. E. Scheffer. 1:100,000 (1 in.=1.58 miles). With inset map of Koimé River, 1:100,000, forming S. E. continuation of main map. Coordinates including both maps: $2^{\circ}32' - 2^{\circ}56' S.$; $140^{\circ}23' - 140^{\circ}45' E.$. Accompanies, as Kaart XII, notes on "De Exploratatie van Ned. Nieuw-Guinea," *Tijds. kon. Ned. Aardr. Genoot.*, Vol. 38, pp. 823-833, 1911.

[Detailed survey of a lake near the coast of Dutch New Guinea at Humboldt Bay and of a tributary river course for 35 miles upstream, opening up hitherto unexplored territory.]

NEW SOUTH WALES. Geological Map of the Forbes-Parkes Gold Field, Geologically Surveyed by E. C. Andrews, assisted by C. E. Murton. [1 in.=80 chains (1:63,360)]. $33^{\circ}0' - 33^{\circ}30' S.$; $147^{\circ}40' - 148^{\circ}15' E.$. 12 colors. With two geological sections. Accompanies "The Forbes-Parkes Gold Field" by E. C. Andrews. *Mineral Resources* No. 13, Geol. Surv. N.S.W., 1910.

NEW SOUTH WALES. Plan Showing Allan Cunningham's Route and Site of First Recorded Discovery of Gold in Australia. [1:400,000 (1 in.=6.3 miles approx.)]. $34^{\circ}40' - 34^{\circ}20' S.$; $149^{\circ}30' - 150^{\circ}20' E.$. Accompanies, on p. 125, "Botanical, Topographical and Geological Notes on Some Routes of Allan Cunningham" by J. H. Maiden and R. H. Cambage, *Journ. & Proc. Roy. Soc. N.S.W.*, for 1909, Vol. 43, Part II, pp. 123-128, 1909.

PAPUA. Map of the Territory of Papua. From the latest Surveys. 1909. 32 miles to an inch (1:2,027,520). $4^{\circ}15' - 14^{\circ} S.$; $140^{\circ}15' - 155^{\circ}13' E.$ 8 colors. With two insets: (1) Samarai (Dinner Island). 8 chains to an inch (1:6,336). $10^{\circ}25' S.$ and $150^{\circ}45' E.$. (2) Port Moresby. Eastern Side Showing Surveyed Townships, etc. One mile to an inch (1:63,360). $9^{\circ}27^{\circ}15' S.$ and $147^{\circ}0' E.$. Accompanies, in pocket, "Handbook of the Territory of Papua, compiled by the Hon. Staniforth Smith, Administrator," 2nd edition, Melbourne, 1909.

[Valuable large-scale official map. Shows, by colors, administrative divisions.]

EUROPE

AUSTRIA-HUNGARY. A Magyar Birodalom Közjogi Térképe (Staatsrechtliche Karte des Ungarischen Reiches). 1:1,000,000 (1 in.=15.78 miles). $49^{\circ}45' - 42^{\circ} N.$; $14^{\circ} - 26^{\circ}15' E.$ 3 colors. Accompanies note with same title by R. Harass, *Bull. Hungarian Geogr. Soc.*, Internat. Edit., Vol. 37, pp. 325-327, 1911.

[Shows boundary of Kingdom of Hungary according to claims which would include Dalmatia, Bosnia and Herzegovina. Map on larger scale than necessary for the purpose, it being a wall map.]

AUSTRIA-HUNGARY. Geologische Übersichtskarte der Umgebung von Hermannstadt. 1:75,000 (1 in.=1.18 mile). $45^{\circ}52' - 45^{\circ}45' N.$; $24^{\circ}0' - 24^{\circ}15' E.$. 6 colors. Accompanies, facing p. 42, "Beiträge zur Geologie der Zibinsebene bei Hermannstadt" by O. Phleps, *Verh. u. Mitt. Siebenbürg. Ver. f. Naturw. zu Hermannstadt*, Vol. 58 (1908), pp. 41-59, 1909.

AUSTRIA-HUNGARY. (a) Isohypsenkarte der Umgebung des Szt. Anna-Sees. 1:50,000 (1 in.=0.79 mile). $46^{\circ}8' N.$ and $25^{\circ}53' E.$

(b) Isobathenkarte des St. Anna-Sees. [1:2,000 (1 in.=166.7 ft.)]

Accompany, as Abb. 7 on p. 103 and Fig. 9 (Taf. XII) facing p. 104, "Der Szt. Anna-See" by J. v. Gelei, *Bull. Hungarian Geogr. Soc.*, Internat. Edit., Vol. 37, pp. 96-118, 1911.

[On map (b) isobath interval 1 meter.]

AUSTRIA-HUNGARY. (a) Carte des environs de Titel. 1:300,000 (1 in.=4.73 miles). $45^{\circ}14' N.$ and $20^{\circ}15' E.$

(b) Les environs du confluent du Danube et de la Tisza. Carte morphologique. 1:1,750,000 (1 in.=27.62 miles). $46^{\circ}12' - 44^{\circ}32' N.$; $18^{\circ}30' - 21^{\circ}5' E.$

Accompany, as Figs. 8 and 9 on pp. 277 and 279, "Compte-rendu du troisième Congrès d'Itinérant de la Société Hongroise de Géographie" by E. de Cholnoky, *Bull. Hungarian Geogr. Soc.*, Internat. Edit., Vol. 37, pp. 275-288, 1911.

AUSTRIA-HUNGARY. Die Geographische Verteilung der Gewitter in Ungarn. [1:5,000,000 approx. (1 in.=78.9 miles)]. Accompanies, as Fig. 1 on p. 302, paper with same title by E. Hélyas, *Bull. Hungarian Geogr. Soc.*, Internat. Edit., Vol. 37, pp. 296-309, 1911.

[Cartogram showing distribution of thunderstorms by quadrangles of $30'$ in lat. and 1° in long. Thirteen degrees of frequency shown.]

AUSTRIA-HUNGARY. (a) [Map of Part of the Görgény Mountains]. [No scale. 1:100,000 approx. (1 in.=1.6 miles)]. [46°45' - 46°30' N.; 24°50' - 25°20' E.].
(b) Geologische Kartenskizze der Mezőhavas Masse. 1:300,000 (1 in.=4.73 miles). [Mezőhavas in 46°44' N. and 25°14' E.].

Accompany, as Taf. XIV facing p. 118 and Abb. 2 on p. 121, "Über das Görgény-Gebirge" by A. Radványi, *Bull. Hungarian Geogr. Soc.*, Internat. Edit., Vol. 37, pp. 118-137, 1911.

[On map (a) relief in contours; interval 100 meters. Limit of cereals, of the vine and of certain trees shown.]

AUSTRIA-HUNGARY. (a) Geologische Skizze des Zempléner Klippengebirges. [1:93,000 approx. (1 in.=1.5 miles approx.)]. [48°55' N. and 21°50' E.].

(b) Topographische Kartenskizze des Zempléner Klippengebirges. [No scale. 1:100,000 approx. (1 in.=1.6 miles approx.)]. Same coordinates.

Accompany, as Abb. 3 and 6 on pp. 149 and 163, "Die Morphologie des Zempléner Klippengebirges" by G. Strömpl, *Bull. Hungarian Geogr. Soc.*, Internat. Edit., Vol. 37, pp. 144-180, 1911.

AUSTRIA-HUNGARY. (Tatra). (a) Cirque de Gasiennicowe Stawy levé à la règle à échimètre et dessiné par Mathias Koncza, novembre 1907. Équidistance 10 m. 1:10,000 (1 in.=0.16 mile). [49°14' N. and 20°0' E.].

(b) Cirques de Koscielnicowe levé à la règle à échimètre et dessiné par Mathias Koncza, novembre 1907. Équidistance 5 m. 1:5,000 (1 in.=16.7 ft.). [49°14' N. and 20°2' E.].

(c) Sondage du Lac Czerwony Staw levé sur la glace avec un décimètre et dessiné par Mathias Koncza, novembre 1907. Équidistance 2 m. Alt. 1672 m. 1:2,000 (1 in.=166.7 ft.). [49°11' N. and 19°53' E.].

Accompany "Les Cirques de Montagne (Alpes fribourgeoises et Tatra)" by M. Koncza, in "Études de Géographie Physique sur le Canton de Fribourg," *Mém. Soc. fribourg Scien. Nat.*, Vol. 7, pp. 149-196, 1910.

ENGLAND. Bartholomew's "Quarter Inch to Mile" Contour Road Map of the Environs of London. 1:253,440=4 miles to an inch. [51°52' - 51°46' N.; 1°23' W. - 1°27' E.]. 11 colors. John Bartholomew & Co., Edinburgh. Price, in case, paper 1/6, on cloth 2/6, on cloth, dissected, 3/-. [This new map is reduced from the corresponding sheets of Bartholomew's well-known half-inch-to-the-mile maps of Great Britain. Relief, as on the larger scale maps, is represented by the 'layer' method of coloring. Eight tints are used on land ranging from a pleasing olive green to brown, and two tints on sea. The main roads are prominently brought out in red. The map, in content and execution is of the usual high standard of excellence of the products of the Edinburgh Geographical Institute. It is admirably suited to all touristic purposes.]

EUROPE. Map [of Europe] Showing the Positions of the Meteorological Stations the observations from which are used in the preparation of the [British] daily weather report. [1:20,000,000 (1 in.=315.65 miles)]. Accompanies, as Fig. 13, facing p. 102, *Sixth Ann. Rep. Meteorol. Committee* for the year ending 31st March, 1911 [Blue Book Cd. 5819], 1911.

[Shows areas from which wireless reports are received within 2 and within 24 hours of the time at which the observations were made. See also *Bull.*, Vol. 43, p. 80, 1911.]

GERMANY. Die räumliche Entwicklung Posen. 1:50,000 (1 in.=0.79 mile). [52°25' N. and 17° E.]. Accompanies, on p. 173, paper with similar title by O. Dalchow, *Geogr. Anzeig.*, Vol. 12, pp. 169-173, 1911.

[Suggestive map of the city of Posen indicating by what areas it has gradually been enlarged].

GERMANY. Die verkehrsgeschichtliche Bedeutung der deutschen Reichsgrenze. [1:5,000,000 (1 in.=78.91 miles)]. 56° - 44½° N.; 0° - 24° E. 2 colors. Accompanies, as Sonderbeil. 59, paper with similar title by E. Schmidt, *Geogr. Anzeig.*, Vol. 12, pp. 150-152 and 175-178, 1911.

[Shows main railroad lines and points where other lines of communication cross the boundary.]

GERMANY. [Map showing the glacial geology of the region between the Elbe and Lübeck]. 1:400,000 (1 in.=6.31 miles). [53°55' - 53°20' N.; 10°20' - 11°0' E.]. Accompanies, on p. 180, "Die Entstehung des Travertins" by C. Gagal, *Jahrb. kgl. Preussischen Geol. Landesanstalt* für 1910, Vol. 31, Part II, pp. 168-192, 1910.

GERMANY. Verbreitung der Salzflora in Anhalt, Provinz-Sachsen und Mark Brandenburg. 1:750,000 (1 in.=11.84 miles). 52°45' - 51°25' N.; 11° - 14° E. 1 color. Accompanies, as Taf. I, "Salzflora und Tektonik in Anhalt, Sachsen und Brandenburg" by O. v. Linstow, *Jahrb. kgl. Preussischen Geol. Landesanstalt* für 1910, Vol. 31, Part II, pp. 23-37, 1910.

GERMANY. Geologische Karte des Dammersfeldes in der Rhön und seiner südwestlichen Umgebung bearbeitet von O. Drehe. 1:50,000 (1 in.=0.79 mile). [50°24' N. and 9°50' E.]. 20 colors. Accompanies, as Tafel II, "Geologische Beschreibung des Dammersfeldes, etc." by O. Drehe, *Jahrb. kgl. Preussischen Geol. Landesanstalt* für 1910, Vol. 31, Part II, pp. 297-342, 1910.

GERMANY. Geologische Übersichtskarte der Warburger Störungzone. 1:40,000 (1 in.=0.63 mile). 51°30' - 51°26' N.; 9°7' - 9°55' E. 20 colors. Accompanies, as Taf. 12, "Der Warburger Sattel, etc." by A. Kraiss, *Jahrb. kgl. Preussischen Geol. Landesanstalt* für 1910, Vol. 31, Part II, pp. 377-419, 1910.

GREAT BRITAIN AND IRELAND. (a) Map Showing Positions of the Climatological Stations. (b) Map Showing the Positions of the Stations having Self-Recording Instruments. Both maps 1:5,000,000 (1 in.=78.91 miles). 61° - 49° N.; 12° W. - 4° E. Accompany, as Figs. 11 and 12 between pp. 80 and 81, *Sixth Ann. Rep. Meteorol. Committee* for the year ending 31st March, 1911 [Blue Book Cd. 5819], London, 1911.

[For comment see *Bull.*, Vol. 43, p. 80, 1911.]

GREAT BRITAIN AND IRELAND. (a) [Thirteen maps of Great Britain and Ireland accompanying "The Building of the British Isles" by A. J. Jukes-Browne, 3rd edit., London, 1911, showing the distribution of land and sea through geologic history. All maps, except where noted differently below: 1:20,000,000 approx. (1 in.=142.0 miles approx.). 60° - 48° N.; 1° W. - 2½° E. 1 color.]

Geography of the (1) Ordovician Time (Arenig). Fig. 10, facing p. 78. (2) Silurian Time (Llan-doverly). Fig. 13, facing p. 96. (3) Lower Devonian Time. Fig. 19, facing p. 128. (4) Lower Carboniferous Time. Fig. 23, facing p. 158. (5) Permian Time. Fig. 31, facing p. 210. (6) The Bunter Epoch. Fig. 34, facing p. 230. (7) The Keuper Epoch. Fig. 37, facing p. 248. (8) Great Oolite Time. Fig. 44, facing p. 274. (9) Portlandian Time. [60° - 48° N.; 9½° W. - 4° E.]. Fig. 46,

facing p. 288, (10) Selbornian Time. [60°-48° N.; 0° W.-5° E.]. Fig. 57, facing p. 324. (11) Late Senonian Time. Fig. 53, facing p. 333. (12) London Clay and of Lutetian Times. Fig. 57, facing p. 350. (13) Upper Pliocene Time. Fig. 72, facing p. 422.

(b) [Two maps of lands bordering the English Channel accompanying same work, viz.: (1) Geography of the Oligocene Period. [1:3,600,000 approx. (1 in.=56.8 miles approx.)]. [51°40'-48°0' N.; 2°40' W.-5°20' E.]. 1 color. Fig. 58, facing p. 358. (2) Geography of Lower Pliocene Time. [1:5,500,000 approx. (1 in.=86.8 miles approx.)]. [53°20'-48°0' N.; 6°40' W.-5°5' E.]. 1 color.

GREAT BRITAIN AND IRELAND. [Map of Census Returns 1911. Great Britain and Ireland]. 1:8,000,000, or 1 in.=126.26 miles. Accompanies, on p. 398, "Some Recent Census Returns" (first part) by O. J. R. Howarth, *Geogr. Journ.*, Vol. 38, pp. 396-404, 1911.

[Shows increase or decrease of population by counties or groups of counties for the decades 1891-1901 and 1901-1911.]

MONTENEGRO. Monténégro. [1:1,400,000 approx. (1 in.=22.1 miles approx.)]. 43°40'-41°40' N.; 18°20'-20°10' E. Accompanies, on p. 41, "Le Royaume de Monténégro," by M. C. Verloop, Paris, 1911.

[Shows chief roads and telegraph stations.]

NETHERLANDS-GERMANY. Overzichtskarta van de tot heden bekende Veenbruggen in Nederland en N. W. Duitschland. 1:2,000,000 (1 in.=31.56 miles). [54°-51½° N.; 51½°-9° E.]. Accompanies, as Fig. 1, on p. 809, "Veenbruggen" en de Nieuw Ontdekte Buinerbrug" by J. A. Mulder, *Tijds. Kon. Nederl. Aardr. Genoot.*, Vol. 28, pp. 801-820, 1911.

[Refers to 'bridges' across the fens of Friesland resembling corduroy roads. Their origin is undetermined.]

SWITZERLAND. (a) Cirque de Oberhaus (Kaiseregg) levé à la règle à échimètre et dessiné par Mathias Koncza. Juillet 1907. Equidistance 5 m. 1:5,000 (1 in.=416.7 ft.). [46°40' N. and 7°20' E.].

(b) Cirque de la Chambre aux Chamois levé à la règle à échimètre et dessiné par Mathias Koncza. Juillet 1907. Equidistance 5 m. 1:5,000. [49°40' N. and 7°15' E.].

(c) Cirque de Brequettaz-Kessel levé à la règle à échimètre et dessiné par Mathias Koncza. Juillet 1907. Equidistance 5 m. 1:5,000. [49°41' N. and 7°16' E.].

Accompany "Les Cirques de Montagne (Alpes fribourgeoises et Tatra)," by M. Koncza in "Études de Géographie Physique sur le Canton de Fribourg," *Mém. Soc. fribourg. Scien. Nat.*, Vol. 7, pp. 149-196, 1910.

SWITZERLAND. Trois "boucles" de la Sarine. Levé à la règle à échimètre par Cesare Calciati. Juillet 1907. 1:10,000 (1 in.=0.16 mile). [46°46' N. and 7°5' E.]. Superimposed on tracing paper: Un des anciens cours hypothétiques de la Sarine approximativement représenté. Accompanies "Les Méandres de la Sarine" by C. Calciati in "Études de Géographie Physique sur le Canton de Fribourg," *Mém. Soc. fribourg. Scien. Nat.*, Vol. 7, pp. 85-146, 1910.

SWITZERLAND. Têtes de ravins du Rio du Petit Rome et du Lavapesson. 1:10,000 (1 in.=0.19 mile). [46°47' N. and 7°8' E.]. Accompanies, on pp. xxiv and xxv, "Ravins et Têtes de Ravins" by L. J. Romain in "Études de Géographie Physique sur le Canton de Fribourg," *Mém. Soc. fribourg. Scien. Nat.*, Vol. 7, pp. xv-xxxv, 1910.

SWITZERLAND. [Five maps accompanying "Les 'Coudes de Capture' du pays fribourgeois" by G. Michel, in "Études de Géographie Physique sur le Canton de Fribourg," *Mém. Soc. fribourg. Scien. Nat.*, Vol. 7, pp. 1-84, 1910:]

(a) Carte hypsométrique de la région de l'ancien prolongement nord-est de la chaîne de collines de la Faye. 1:100,000 (1 in.=1.58 miles). [46°53'-46°48' N.; 7°7'-7°17' E.]. Fig. 4 on p. 18.

(b) État ancien de la Vallée du Tigelet-Lavapesson. [No scale. 1:75,000 approx. (1 in.=1.2 miles approx.)]. [46°50' N. and 7°6' E.]. Fig. 8 on p. 25.

(c) Topographie glaciaire du bassin supérieur de la Crausa. 1:15,000 (1 in.=0.24 mile). Fig. 10 on p. 30.

(d) Ancien cours de la Tafarna. 1:100,000. [46°51'-46°45' N.; 7°9'-7°18' E.]. Fig. 16 on p. 49.

(e) Rapport ancien des bassins de la Sarine et de l'Aar. [No scale. 1:600,000 approx. (1 in.=9.5 miles approx.)]. [46°43'-47°15' N.; 7°5'-7°40' E.]. Fig. 21 on p. 63.

WORLD AND LARGER PARTS THEREOF.

NORTH AMERICA AND EUROPE. Map showing Glaciated Areas in North America and Europe. [1:100,000,000 approx. (1 in.=1578 miles approx.)]. [90°-20° N.; 135° W.-70° E.]. Accompanies, as Fig. 122' facing p. 445, "The Ice Age in North America" (5th Edition) by G. F. Wright, Oberlin, O., 1911.

PART OF NORTHERN HEMISPHERE. Map of Portion of Land Hemisphere Showing Paleozoic land connections and paths of marine faunal migrations. [1:160,000,000 approx. (1 in.=2525 miles approx.)]. Accompanies, as Fig. 19 on p. 484, "Revision of the Paleozoic Systems" by E. O. Ulrich, *Bull. Geol. Soc. Amer.*, Vol. 22, pp. 281-680, 1911.

WORLD. (a) [Map of the World showing present distribution of the genera *Acraea*, *Melanitis*, *Mycalesis* and of the family *Vanitidae* in relation to the extent of the Late Paleozoic or Early Mesozoic Continent]. Mollweide's projection [1:103,000,000 approx. (1 in.=3046.0 miles approx.)].

(b) Map of the World showing present distribution of the *Terias Catopsilia* and *Ampullaria* and of the *Testacellidae* in relation to the extent of the Equatorial Mesozoic Continent (after Schuchert, Lapparent and Lull). Same projection and scale.

Accompany, on pp. 415 and 417, "Zoogeography" (review of Bartholomew's Atlas of Zoogeography) by H. O. F., *Geogr. Journ.*, Vol. 38, pp. 413-419, 1911.

WORLD. Vie di Comunicazione Mondali. [Mercator projection: equatorial scale 1:192,000,000 approx.]. 13 colors. With two insets on Mercator projection, 1:600,000,000 approx., showing distribution of races and of religions. Accompanies, facing p. 101, "Le Grandi Comunicazioni di Terra e di Mare" by L. Giannitrappani, Bologna, 1911.

[Shows clearly principal steamship routes with time of passage and the chief railroad lines.]

WORLD. The World's Telegraphic System, 1911. [Mercator projection: equatorial scale 1:190,000,000 approx.]. No map net. 1 color. Accompanies, facing p. 541, "Imperial Telegraphs" by C. Bright, *United Empire*, Vol. 2 (New Series), pp. 541-552, 1911.

[Distinguishes between non-British and all-British submarine cables. Shows proposed British cables.]

OCEANOGRAPHICAL

NORTH ATLANTIC OCEAN. (a) Carte Montrant la Distribution de la Température à la Profondeur de 1,000 Mètres et à celle de 50 Mètres à l'Époque du Frai des Principales *Gadides* (Printemps). Dressée par M. I. N. Nielsen. [1:20,000,000 approx. (1 in.=315.7 miles approx.)]. 60°-43° N.; 35° W.-2° E.

(b) *Gadus Pontassou*. Carte Montrant la Différence d'Extension entre la Zone où Fraie une Espèce et son Aire de Distribution. [1:36,600,000 approx. (1 in.=580.2 miles approx.)]. 73°-47° N.; 33° W.-30° E.

Accompany, as Figs. 16 and 17 on pp. 184 and 185, note on "Distribution des lieux de ponte des *Gadides* dans l'Atlantique nord" by L. Laloy, *La Géogr.*, Vol. 24, pp. 183-186, 1911, based on paper on same subject by J. Schmidt in *Rapp. et proc. verb. du Conseil Internat. pour l'explor. de la mer*, Vol. 10, 1909, from which the maps are taken.

CARTOGRAPHICAL

FRANCE. Un dessin-modèle du rocher en haute montagne: le Cirque du Creux Noir (Vanoise). Extrait du 25^e Cahier du Service Géographique de l'Armée (France): Les Erreurs de la Carte de France par le Général H. Berthaut, planche XIX. 1:100,000 (1 in.=0.16 mile). [45°24' N. and 6°45' E.]. Accompanies, as Fig. 1 on p. ix, "La Méthode de l'Échantillonnage Topographique au Service de la Morphologie" by J. Brunhes, introduction to "Études de Géographie Physique sur le Canton de Fribourg", *Mém. Soc. fribourg. Scien. Nat.*, Vol. 7, pp. iii-xiii, 1910.

[Exemplary in its treatment of bare rock on high mountain summits. Recommended by Prof. Brunhes to his students as a model topographic basis for detailed physiographic type studies.]

ITALY. [Three sections of the Map of Italy, 1:100,000 (1 in.=1.58 miles), showing different editions, together with plates of conventional signs:] (1) Tipo dell' Edizione in Nero con l'Orografia a Curve e Tratteggio. (2) Tipo dell' Edizione Policroma con l'Orografia a Curve e Sfumo. 5 colors. (3) Tipo della Nuova Carta. 6 colors. (4) Segni Convenzionali della Nuova Carta. 3 colors. Accompany, as Tav. I, II, IV and III, "La Nuova Carta d'Italia al 100,000 del nostro Istituto Geografico Militare" by Capt. L. Giannitrapani, *Boll. Soc. Geogr. Italiana*, Vol. 12, pp. 1100-1203, 1911.

[The principal innovation on the new map is that the system of roads is brought out prominently in red. Distinction is made between four classes of roads. Relief is represented by brown contours, rendered plastic by hill-shading. Drainage in blue, woods in green areal coloring.]

TURKEY IN ASIA. Studie zu Dr. Viktor Pietschmanns photogrammetrischen Aufnahmen in Mesopotamien vom techn. Oberoffizial Ignaz Tschamler. Wien, Juni 1911. 1:10,000 (1 in.=0.16 mile). Accompanies, as Taf. XVI, paper with same title by same author, *Mitt. k.k. geogr. Gesell. in Wien*, Vol. 54, pp. 409-431, 1911.

[Map deduced from three topographic views. Dr. Pietschmann's results admirably demonstrate the feasibility and value of photo-topographic methods in exploratory surveys.]

OTHER ACCESSIONS

DECEMBER, 1911

AMERICA

(The size of books is given in inches to the nearest half inch.)

AUBURY, LEWIS E. General Index to Publications of the California State Mining Bureau. (III.) State Mining Bureau, San Francisco. 1907. 9 x 5½.

AUBURY, LEWIS E. Mineral Productions, County Maps and Mining Laws of California. *Bull.* 60 California State Mining Bureau, San Francisco. No date. 6 x 9½.

EATON, ELON HOWARD. Birds of New York. Part I. Memoir 12. New York State Museum. 63rd Annual Report, 1909. Vol. 3. Appendix 5. Maps, and 42 plates in colors. University of the State of New York. Albany. 1911. 12 x 9.

HARRIS, WM. T. The Erie Michigan Canal. Preliminary Data and Profiles Along the Various Proposed Routes. (Maps and Ills.) South Bend Chamber of Commerce. 1911. 9 x 6.

HOLMES, J. S. Forest Fires and their Prevention, including Forest Fires in North Carolina during 1910. (Pamphlet.) North Carolina Geological and Economic Survey. Economic Paper No. 22. Raleigh, 1911. 10 x 6½.

IHERING, H. von, Director do Museu. Revista do Museu Paulista, Vol. VIII. Typographia do Diário Oficial, São Paulo. 1911. 9½ x 6.

WHITLOCK, HERBERT P. Calcites of New York. Memoir 13. New York State Museum. 63rd Annual Report, 1909. Vol. 4. Appendix 6. Illustrated. University of the State of New York. Albany. 1911. 12 x 9.

— New York State Museum. 63rd Annual Report, 1909. In 4 vols. Vols. I and II. (Miscellaneous Papers.) Illustrated. University of the State of New York, Albany. 1911. 9 x 5½.

AFRICA

NASH, W. L., Compiler. Egypt Exploration Fund. A General Index to the Archaeological Reports. Vols. I-XVIII. 1890-1-1908-9. Published at the Offices of the Fund, London, 1911. 9½ x 6.

EUROPE

RODRÍGUEZ, JOSÉ GALBISS Y. Ensayo de los Métodos Fotogramétricos, en el Término Municipal de Otero de Herreros (Provincia de Segovia) [Maps, diagrams and ills.] Imprenta de la Dirección General del Instituto Geográfico y Estadístico, Madrid. 1908. 10½ x 7.

INDEX TO VOL. XLIII.

rev. Denotes Reviews; *n.* Short Notices and Comment on Maps;

*Bibliographical Entry.

Maps are indexed under their respective Countries.

A.

Aanwinsten. Catalogus der Koloniale Bibliotheek . . . Kon. Inst. vaar de Taal, Land en Volkenk. Ned. Indië, 156*

Abdul Hamid II. Le Sultan, l'Islam et les Puissances. V. Bérard, *rev.*, 699

Abendanon, E. C. Breukenkust van Mandar, 637*; Celebes en Halma-hera, 224*; Expedition der Kgl. Niederländ. Geogr. Gesellschaft nach Zentralcelebes, 1909-10, 792*; Map, 549*; — and W. Schiebel. Reizen door Centraal-Celebes (Map), 549*

Abitibi, Une Expédition dans. F. Lali-berté, 715* ¶ Maps of: Abitibi Region indicating surveyed Townships traversed by the Transcontinental R.R., etc., *n.*, 633; Vicinity of the National Transcontinental R.R., 633*

Abraham, G. D. British Mountain Climbs, *n.*, 701; Swiss Mountain Climbs, *n.*, 701

Abruzzi, In the. A. Macdonnel, *n.*, 702

Abruzzi, H. R. H. Duke of the. Ex-pedition to the Karakoram. F. de Filippi, 225*

Abyssinia. See also Ethiopia: ¶ In Abissinia. C. A. Annaratone, 869*; Aridity, Salt Deposits and Currency. A. Tancredi, 692; Criminali, giudici e tribunali etiopici. L. de Castro, 636*; In Dancalia ed in Abissinia. M. Lega, 636*; Zur Geschichte der äthiopischen Eisenbahnen. A. Ilg, 67*; Innerpolitischen Verhältnisse Abessinien, 153*; Une nouvelle fon-dation aux Pays Gallas. R. P. Cy-prien, 67*; Principali studi pubblicati in occasione della missione Duchesne-Fournet in. C. C. Rossini, 67*; Reise nach Harar und Adis Abeba. F. J. Bieber, 67* ¶ Map of Abyssinia: Re-cent Surveys in Southern, 797*

Aconcagua, Penitentessneefelder Ge-biet zwischen — und Tupungato. Dr. F. Reichert, 475*

Acre, Territoire fédéral l' — et la ligne du Madeira au Mamoré. P. Walle, 636*

Adam, J. W. H. Weltkarte der Erz-lagerstätten, *n.*, 80

Adamaua, Bericht über eine Bereisung des Ostgrenzgebietes der Residentur —. K. Strümpell, 555*

Adamellogruppe, ein alpinies Zentral-massiv, und seine Bedeutung für Ge-birgsbildung und unsere Kenntniss von dem Mechanismus der Intrusionen. W. Salomon, 478*

Adams, C. C. Foundations of Econo-mic Progress in Tropical Africa, 753

Adams, F. The Banana and its Rela-tives, 794*

Adams, F. D., and A. E. Barlow. Ge-ology of Haliburton and Bancroft Areas, Ontario, 66*

Addis Abeba: Reise nach Harar und Adis Ababa. F. J. Bieber, 67*

Adelaide Chamber of Commerce, Six-tieth Annual Report of, 226*

Aden Hinterland, Geology of. Capt. R. E. Lloyd, 70*

Adirondack Region, Sketch Map of S. E. — showing relation of pre-glacial drainage to that of the pres-ent, 795*

Adler, B. F. Maps of Primitive Peo-ples [in Russian], 316*; Resumé in English, 669

Adrar, De l' — à la Baie du Lévrier. Lieut. Mugnier-Pollet, 556* ¶ Map of Adrar: Itinéraire du Capitaine Cortier dans, 79*

Adriatic Sea: ¶ Italienisch-österrei-chische Projekt einer gemeinsamen Er-forschung des Adriatischen Meeres. Dr. E. Brückner, 73*; Erforschung des Adriatischen Meeres. Prof. Dr. A. Grund, 718*; Vorläufiger Bericht über die erste Kreuzungsfahrt *Najade* in der Hochsee der. Prof. Dr. E. Brückner, 718* ¶ Map of Adriatic Sea: Temperatur der Meeresober-fläche und der Luft, 551*

Aeronautics: ¶ Aviation and Aeroplanes. Capt. I. W. Chambers, 635*; Aeronautics and Climate, 624; Aviation Cartography, 779; Les grandes routes de l'air, 794*; Maps for Aeronauts, 203; Maps for Airships. C. Lallemant, 922

Afghanistan: Bahnprojekt. Dr. E. Zugmayer, 155*

Africa: ¶ Africa. Being an Accurate Description of the regions of Aegypt, Barbary, Lybia, Abyssines, etc. Collected and Translated from most Authentick Authors by John Ogilby (1670), 319*; Big Game of. R. Tjader, *rev.*, 302; Catalogue of Fresh-Water Fishes of — in the British Museum. G. A. Boulenger, Vol. I, 314*; Vol. II, 800*; Les divisions phytogéographiques de l'Afrique. Prof. Dr. Engler, 67*; Lieut. Boyd Alexander's Exped., 55; Prince Henry of Portugal and the African Crusade of Fifteenth Century. C. R. Beazley, 317*; Prof. H. Meyer Returns to, 526; Transkontinentale Bahnen und die Kap-Kairo-Linie. Dr. R. Hermann, 153*; Le Transafrican de Matadi à Dar-es-Salam. A. J. Wauters, 716*; Voyage to the Coast of Africa in 1758. J. Lindsay, 400* ¶ Maps of Africa: Vegetation. Dr. M. Hardy, *n.*, 80; Goode's Base Map, *n.*, 712; Isotherms for Africa, *n.*, 707; Map of — [in Arabic], *n.*, 159; Maps showing territories in which various types of bows are used, 707*

Central Africa: ¶ Beiträge zur Anthropologie von Zentral-Afrika. J. Czekanowski, 68*; Commerce tripolitaïn dans le centre africain. J. Etiévant, 69*; Duke of Mecklenburg's Expedition, 855; In the Heart of Africa. Duke Adolphus Frederick of Mecklenburg, *rev.*, 863; Living Speech in — and South Africa. Essay Introductory to Bantu Family of Languages. A. C. Madan, *rev.*, 925; Wild and Wilde im Herzen Afrikas. H. Schomburgk, *n.*, 926 ¶ Maps of Central Africa: Dr. Karl Kumm's Route, 472*; Route of the Expedition of the Duke of Mecklenburg, 1907-08, 955* East Africa, Map: Karte der Eisenbahnen in Ost-Afrika, *n.*, 78

North Africa: ¶ Les Blancs d'Afrique. Dr. H. Weisgerber, *n.*, 64 ¶ Map of North Africa: Der Orient. E. Banse, *n.*, 78

South Africa: ¶ Application of Science to the Ostrich Industry. Prof. J. E. Duerden, 396*; Archæological Dis-

coveries of Dr. C. Peters, 55; Climate and Rainfall of. R. T. A. Inness, 197; Gravity in. R. A. Lehfeldt, 791*; Introduction d'industries nouvelles dans l'Afrique australe, 315*; Marine Investigation in —. Vol. V., *n.*, 64; Mystery of Zimbabwe. F. A. Edwards, 951*; Pre-Historic Period in. J. P. Johnson, *rev.*, 537; Railway Projects in, 155*; Report of Magnetic Survey of. J. C. Beattie, *n.*, 926; Dans le Sud-Africain et au seuil de l'Afrique Centrale. A. Bertrand, *n.*, 927; Yellow and Dark-Skinned People of Africa South of the Zambesi. G. M. Theall, *rev.*, 537 ¶ Maps of South Africa: Mafeking. Portion of Marico and Lichtenburg Districts, Zeerust. Portions of Marico, Rustenburg and Lichtenburg Districts, 159*; South Africa Showing Railways, *n.*, 79

South West Africa: ¶ On Collection of Dried Plants obtained . . . by Percy Sladen Memorial Expeditions, 1908-11. H. H. W. Pearson, 717*

Tropical Africa: ¶ Foundations of Economic Progress in. C. C. Adams, 753

West Africa: ¶ Beitrag zur Kenntniss des Klimas von Salaga, Togo und der Goldküste. G. A. Krause, 950*; Mission en Afrique Occidentale. Des pays Touareg du Niger à la Côte de l'Or par le Haut-Togo. G. de Gironcourt, 950*; Railroads in West Africa, 54; Recent Developments in. J. A. Cooper, 69*

British Colonies in Africa: ¶ Angleterre en Afrique. Capt. E. de Renty, *n.*, 781; Britain Across the Seas. Africa. History and Description, etc. Sir Harry Johnston, *rev.*, 375; Colonies anglaises d'Afrique, 68*

British East Africa: ¶ African Game Trails. T. Roosevelt, *rev.*, 205; Die Masai. Ethnographische Monographie eines ostafrikanischen Semitenvolkes. M. Merker, *rev.*, 928; Hunting Adventures in the Big Game Country. J. T. McCutcheon, *n.*, 375; Topographic Surveys in, 289 ¶ Maps of British East Africa: East Africa Protectorate. Maps to show area covered by triang. and top. survey, 310*; East Africa Protectorate: Mangua; Takaungu, *n.*, 471*; Duke of Mecklenburg Expedition's field Work. Lieut. M. Weiss, *n.*, 956; Sheet Malindi and Surrounding Country, 708*; ¶ Map: Allgemeine Übersichtsskizze der Wohngebiete des Masaivilkes,

956*; Sketch of country between Juba R. and Lake Rudolf, 876*

Union of South Africa (British South Africa): ¶ Directors Report and Accounts for 1910, 555*; A Nation in the Making. A. L. Smith, 791*; Proceedings of Geol. Soc. of South Africa, 1910, 637*; Report of Geol. Surv. for 1909, 315*; Union of South Africa. The Hon. R. H. Brand, *rev.*, 205

French Colonies in Africa: ¶ Coup d'œil sur les explorations en Afrique au début du XX^e siècle, etc. Baron Hulot, 869*

French Equatorial Africa: ¶ Afrique équatoriale. Situation générale, 869*; Le Bassin de l'Ombella. R. Cuvillier-Fleury, 791*; Exploration de la rivière N'Goindé. E. Mallet, 476*; French Mission to Lake Chad. Capt. J. Tilho, 223*; Grands travaux au Congo Français, 154*; MacLeod Falls on the Mao Kabi. P. A. Talbot, 637*; Mise en valeur du Territoire du Tchad. Lieut.-Col. H. Mill, 223*; Le Nomadisme des "Fangs." L. Martrou, 314*; Organisation militaire de l'Afrique Équatoriale. Col. Gouillet, 395*; Rapport sur le fonctionnement du laboratoire de Brazzaville depuis 1906. [Sleeping Sickness Investigations.] Heckenroth, 791*; Reconnaissances sur l'Ogowé. J. Dubrouillet, 555*; Résultats scientifiques de la mission Tilho. Ch. Lallemand, 223*; Situation générale de l'Afrique Équatoriale Française. Gov. Gen. Merlin, 154*; Statistiques du Commerce . . . 1908. Congo français et Dépendances, 555*; Statistiques de l'Industrie Minière . . . 1908. Congo français et Dépendances, 791*; Voyage au Congo (1909). M. A. de Romeu, 314*

French West Africa: ¶ L'Afrique Occidentale Française et la Nigeria Anglaise. B. de l'Escale, 68*; Le Commerce en 1909. C. Rabot, 314*; De l'Atlantique au Tchad et au Borkou. (Mission Tilho). Lieut. M. Mercadier, 476*; Cacao en, 154*; Chemin de fer de Konakry au Niger. A. Terrier, 154*; Commercial Development, 68*; Confréries musulmanes et le Maraboutisme dans les pays de Sénégal et du Niger. M. Delafosse, 716*; Essor de l'Afrique Occidentale Française. A. Terrier, 716*; Du Guir à la Mauritanie. Le capitaine Doury, 476*; Mission du Colonel Mangin, 1910, 223*; Mission industrielle et commerciale en Afrique Occid. Franç. Cap. Schiffer, 154*;

Mission Chevalier, 154*; Populations géophages de l'Afrique Occidentale. H. Hubert, 716*; Situation générale, etc. Gov.-Gen. Ponty, 68*; Statistiques du Commerce, 1908, 556*, 716*; — de l'industrie minière, 1908, Exploitation de l'or, 793* ¶ Maps of French West Africa: Carte de l'Afrique Occidentale Française. Feuille 2. Tombouctou, 797*; Carte démographique de, 472*; Carte du Réseau complet des chemins de fer projetées en, 797*

German Colonies in Africa: ¶ Eisenbahnbau, 396*; Handel der afrikanischen Kolonien und Samoas, 1909, 68*; Wirtschaftlichen Fortschritte unserer afrikanischen Kolonien. Maj. W. Langfeld, 791*

German East Africa: ¶ Über Baumwollkultur in Deutsch-Ostafrika, 791*; Cotton growing in. L. Hamilton, 869*; Expedition of the Hamburg Geog. Soc., 856; Destruction of Telegraph Lines by Giraffes, 289; Deutsche Tanganjika-Njassa-Gebiet. E. Zimmermann, 68*; East African Central Railroad, 368; Geological Expedition to East African Rift Valleys, 856; Wie evangelische Missionare unsere Neger arbeiten lehren. K. Axenfeld, 637*; Zur Geologie und Hydrologie von Daressalam und Tanga. W. Koert und F. Tornau, *n.*, 927; Heissen Quellen von Mtigata in Karagwe. E. Fr. Kirschstein, 154*; Das Hochland der Riesenkrater und die umliegenden Hochländer Deutsch Ostafrikas. Teil I. Dr. F. Jaeger, 716*; Kautschukkultur in Deutsch-Ostafrika, 154*; Mit Lindequist durch Ostafrika. Maj. A. D. Schlobach, 68*; Meteorologische Beobachtungen aus Deutsch-Ostafrika. Dr. P. Heidke, 154*; Prof. H. Meyer returns to, 288; Sisalkultur in Deutsch-Ostafrika, 68*, 315*; Ueber Rindviehzucht in unserer Kolonie, 869*; Wirtschaftliche Entwicklung des südwestlichen Deutsch-Ostafrika. E. Zimmermann, 315*; Aux Sources du Nil. Dans la région des volcans du Lac Albert-Edouard et du Ruwenzori. Lieut. G. Vervloet, 556* ¶ Maps of German East Africa: Abflusslose Rumpfschollenland zwischen Iramba, Njarasasee, Ubugwe und Ufome. F. Jaeger u. W. Rux, *n.*, 548; Expedition's field Work (Duke of Mecklenburg's) Lieut. M. Weiss, *n.*, 956; Hochland der Riesenkrater und die südlich anschliessenden Gegenden bis zum Hanang, usw. F.

Jaeger und W. Rux, *n.*, 547; Karte des besiedelten Gebietes der Landschaft Turu. R. Schultze, *n.*, 797; Massai-Reservat südlich des Kilimandscharo, *n.*, 159; Neue Grenze zwischen Belgisch-Kongo u. Deutsch Ost-Afrika, 547*; Skizze von Daresalam mit den in den Jahren 1901-5 ausgeführten Bohrungen, 956*; Skizze der Hamitischen Sprachgebiete in Aequatorial-Ostafrika. B. Struck, *n.*, 548; Allgemeine Übersichtsskizze der Wohngebiete des Masaivolkes, 956*; Skizze von Tanga mit den in 1902-3 ausgeführten Bohrungen, 956*; Skizze von Unjangwira und den Nachbarlandschaften. Maj. v. Prittwitz u. Gaffron, *n.*, 797

German Southwest Africa: ¶ Ackerbau in Deutsch-Südwestafrika. Dr. Golf, 637*; Arbeiten und Aufgaben in. Prof. E. A. Fabarius, 791*; Buschleute der Namib, ihre Rechts- und Familienverhältnisse. Oberleut. Trenk, 154*; Denkschrift des Gouvernements von — über Rinderzucht des, 950*; Die deutsche Süd-Kalahari. Dr. P. Range, 869*; Erforschung der Namib. Dr. Kleinkemmm-Kettwig, 69*; Erkundung der Hunsberge. Lieut. Drews, 396*; Die Fischerei an Westküste Süd-Afrikas, *n.*, 206; Im Gebiet der Etoshapfanne. D. Hutter, 69*; Kalkpfannen des östlichen Damara-landes. Dr. H. Michaelsen, 154*; S. Passarge, 154*; Lüderitzland. Dr. P. Range, 716*; Notes on . . Diamonds. C. Krause, 637*; Origin of German South-West African Diamonds. P. A. Wagner, 69*; Südwestafrikanische Diamantensorgen, 154*; Reisestudien aus. Prof. Dr. E. Moritz, 791*; Tirashochfläche. Dr. Moritz, 396*; Verbindungsweg zwischen Deutsch-Südwestafrika und der Betschuanenland Eisenbahn. F. Seiner, 154*; Wollschafzucht in Deutsch-Südwestafrika. Dr. E. Breitung, 556* ¶ Maps of German Southwest Africa: Deutsch-Südwestafrika. P. Sprigade and M. Moisel, *n.*, 231; Farm-Übersichtskarte von dem Bezirk Gibeon und dem Distrikt Maltahöhe, *n.*, 956; Karte der Tizas Hochfläche, *n.*, 159; Skizze des Weges Otjivarongo-Waterberg, 548*

German West Africa: ¶ See Kamerun and Togo.

Portuguese West Africa, Map: ¶ Portugiesische Grenzgebiet gegen Deutsch-Südwestafrika zum Verfolg

der militärischen Operationen im Distrikt Huilla, 547*

Agadir, Maps of: ¶ Agadir und Umgebung, 797*; Le Port d' —, 797*; Tiefenverhältnisse der Bucht von, 797*

Agassiz, Alexander: His Life and Scientific Work. Sir John Murray, 794*

Agassiz Lake, Glacial. Map of the — showing preglacial Drainage in the Basin of Lower Great Lakes, 954*

Agricultural Labor: Enquête Intern. sur la main-d'œuvre agricole dans les colonies et les pays tropicaux, 559*

Agricultural Staples, Causes of Increased Cost of. E. D. Jones, 399*

Air. See Atmosphere.

Aitken, Dr. J. Did the Tail of Halley's Comet affect the Earth's Atmosphere?, 228*

Aitoff, D. Colonisation russe en Asie, 637*; Projet de transcription des noms géographiques de l'empire russe sur la future carte intern. du monde au millionième, 478*

Alabama: Geological Survey of, 521; Results of Spirit Levelling . . 1896 to 1909. R. B. Marshall, 313*; Southern Part of Cahaba Coal Field. C. Butts, 867* ¶ Maps of Alabama: Columbiana Quad., 873*; Map to show production of cotton in 1909, 229*; Map and Sections of S. Part of Cahaba Coal Field. C. Butts, 629*; Montevallo Quadrangle, 75*; Sketch map showing location of iron-ore and marble Deposits S. E. of Calera, 874*; Soil Survey Map of Tallapoosa Co., 229*

Alaska: ¶ Conditions of Wild Life in. M. Grant, 714*; Alaska Earthquakes of 1899. L. Martin, 151*; Geographical Influences in — L. Martin, 313*; Cruise of Revenue-Steamer Corwin in Alaska and the N. W. Arctic Ocean in 1881, I. C. Rosse, J. Muir et al, 720*; Geology of Berners Bay Region. A. Knopf, 635*; Geol. Reconnaissance in S. E. Seward Peninsula and Norton Bay-Nulato Region. P. S. Smith and H. M. Eakin, 867*; Lecture on. Hon. J. G. Brady, 365; Results of Prel. Study of the so-called Kenai Flora of. A. Hollick, 553*; Telegraph and Cable Systems of — and the Philippines and Operations in the U. S., 948*; Water-Power Reconnaissance in S. E. —. J. C. Hoyt, 474*; National Geographic Soc. Researches in. L. Martin, 948*; ¶ Glaciers: Glacial Advance in Alaska

- and Earthquakes, Prof. R. S. Tarr, 285; Glacial Studies in, 448; Glaciers of Prince William Sound and Southern Part of Kenai Peninsula. U. S. Grant and D. F. Higgins, 321, 401, 721. ¶ Harriman Alaska Series (Smithsonian Institution): Geology, B. K. Emerson, C. Palache, *et al*, 480*; History, Geography, Resources. Wm. H. Dall, C. Keeler, *et al*, 480*; Narrative, Glaciers, Natives. J. Burroughs, J. Muir and G. B. Grinnell, 480*; Bryozoans. A. Robertson, 480*; Crustaceans. M. J. Rathbun, H. Richardson, *et al*, 480*; Enchytraeids. G. Eisen, 480*; Hydroids. C. C. Nutting, 480*; Insects. Wm. Ashmead, N. Banks, D. W. Coquillett, *et al*, 480*; Land and Fresh Water Mollusks. Wm. H. Dall, 480*; Nemerteans. W. R. Coe, 480*; Tubicolous Annelids. K. J. Bush, 480*; ¶ Minerals and Mining: Coal and its Utilization. A. H. Brooks, 474*; Geol. and Mineral Resources in Solomon and Casadepaga Quadr. P. S. Smith, 474*; Mineral Resources of Nulato-Council Region. P. S. Smith and H. M. Eakin, 151*; Mining in — 1910, 133; Mining and Prospecting on Prince William Sound in 1909. U. S. Grant, 151*; in Seward Peninsula. F. F. Henshaw, 474*; in Southeastern —. A. Knopf, 474* Prel. Report on Mineral Resources of southern Part of Kenai Peninsula. U. S. Grant and D. F. Higgins, 151* ¶ Maps of Alaska: Map of Part of, 158*; Physical Map, *n.*, 954; Map compiled from Surveys of Alaska Road Comm., *n.*, 875; Sketch Map Showing Distribution of Forest, Glaciers and Snowfields, 390*; U. S. G. S. Maps: Distribution of Timber, 630*; Geological Maps of: Central Alaska, 795*; Berners Bay Region, 228*; Fairbanks District. L. M. Prindle and F. J. Katz, 795*; Nizina District. F. H. Moffitt and S. R. Capps, 874*; Nulato-Norton Bay Region, *n.*, 630; Omilak Region, 630*; S. E. Seward Peninsula, *n.*, 630; Solomon and Casadepaga Quads., 157*; Geol. Reconnaissance Map of Mount McKinley region. A. H. Brooks and L. M. Prindle, 795*; Index Map — Showing Areas covered by Topographic Maps, *n.*, 389; Map of Copper and Chitina Valleys, 874*; Reconnaissance Maps of Mount McKinley region, 795*; S. W. Part of Kenai Peninsula, 308*; southwestern Seward Peninsula, 629*; Yukon-Tanana Region, Circle Quad., *n.*, 629; Relation of Alaska Coal Fields to Transportation Routes, 308*, *n.*, 953; Relief Map of Central, 794*; Sketch Map of Bonfield and Kantishna regions, 795*; Sketch Map showing distribution of timber in Mount McKinley Region, 795*; Topographic Maps: Berners Bay Region, 228; Nizina District, 874*; Solomon and Casadepaga Quadrangles, 157*; Yentma Mining District. R. W. Porter, 795*; U. S. Coast and Geod. Survey Charts: Alaska Peninsula and Aleutian Islands to Seguam Pass, 545*; Arctic Coast of, 157*; Bristol Bay: Nushagak Bay and Approaches, 309*; Cape St. Elias to Shumagin Islands, 545*; Shelikof Strait and Afognak Island, 309*; Sketch of General Progress, 1909-10, *n.*, 470; Wrangell Strait, 875*
- Albania: Au Montenegro et en Albanie. Baron J. de Witte, 315*; Wanderung durch das östliche Bosnien, Montenegro und Albanien. L. Edlinger, 477*
- Albemarle Sound from Pasquotank R. to Roanoke and Chowan Rivers, Chart U. S. Coast and Geod. Survey, 309*
- Alberta: ¶ Coal Fields of Jasper Park. D. B. Dowling, 948*; Edmonton Coal Field. D. B. Dowling, 554*; Lake Minnewanka Section. H. W. Shimer, 949*; Pre-Cambrian Rocks of Bow River Valley. C. D. Walcott, 222* ¶ Maps of Alberta: Bow River Valley between Bow Peak and Castle Mountain Station, 77*; Cereal Map of, *n.*, 159; Index to Townships in Alberta, etc., 230*, *n.*, 390; Top. Sketch of Portion of Jasper Park, 796*; Sketch Maps Showing Topography of the 18th, 17th, 15th, 10th, and 9th Base Lines, 390*
- Alcock, Sir Rutherford. Art and Art Industries in Japan, 236*
- Alcoolisme dans les colonies et les pays tropicaux. Dr. Kermorgant, 479*
- Aldabra Islands, Being an account of — and Neighboring Islands not Explored by Prof. J. S. Gardiner. J. C. F. Fryer, 316*
- Aleppo. M. Holzmann, 717* ¶ Map showing Gertrude Bell's Route from Aleppo to Konia, 957*
- Alexander, Lieut. Boyd, Diary of his Explorations, 55

- Alexandria, Notes on temperature at. J. I. Craig, 636*
- Algæ, Marine, Method of Mapping the Distribution of. N. M. Johnson, 399*
- Algeria: ¶Algérie. V. Demontès, 790*; Les Beni-Messaoud. Baron de Vialar, 476*; Étude d'une zone frontière. Confins algéro-marocains. A. Bernard, 790*; Exploitation de l'Alfa et les ressources naturelles dans l'Annexe d'El-Aricha. A. Izard, 476*; Des facteurs de l'acclimatation du bétail européen en Algérie et dans les pays chauds. Th. Monod, 314*; Les mines de plomb et de zinc. P. Lemoine, 716*; Montagnes d'Algérie. Mouzaïa, Aurès, Djurdjura. Gen. Bernard, 69*; L'œuvre française dans les Confins Algéro-Marocains et ses Résultats politiques. A. Bernard, 223*; Œuvre de la France en Algérie jugée par les indigènes. J. Desparmet, 869*; Tabacs en Algérie. G. Méliat, 69* ¶Maps of Algeria: État d'avancement des travaux. Tableau d'assemblage des Cartes d'Algérie et de Tunisie, Serv. Géog. de l'Armée, 547*, 707*; Frontière Orano-Marocaine septentrionale, 708*; Mines de Zinc, de Plomb et de Cuivre, 547*; Zones pacifiées de 1903 à 1910, 707*
- Algonquin and Nipissing, Instrumental Survey of Shorelines of Extinct Lakes of. J. W. Goldthwait, 949*
- Ali Khan, Syed Sirdar. Lord Curzon's Administration of India, *rev.*, 783
- Allan, J. A. Ice River District, B.C., 948*
- Allard, Hon. J. Richesse forestière de la province de Québec, 554*
- Alldridge, T. J. Sierra Leone and Its Commercial Expansion, 717*
- Allegheny Region, Southerly Extension of Onondaga Sea in. E. M. Kindle, 714*
- Allen, G. M. Irrigated Lands of the State of Washington, 714*
- Almagià, Prof. R. Val di Comino o Cominese, 639*
- Almanach de Gotha. Annuaire général, diplom., et stat., 1911, 320*
- Almanack for the Year of Our Lord, 1911. J. Whitaker, 320*
- Alps: ¶Les Alpes et les grandes ascensions. E. Levasseur, 238*; Im Ballon über die Jungfrau nach Italien. G. A. Guyer, *n.*, 946; Beiträge zur geologischen und topographischen Kenntniss der östlichen Alpen. A. V. Klipstein, 238*; Érosion glaciaire et la formation des vallées alpines. E. de Martonne, 558*; Features of Alpine Scenery due to Glacial Protection. Prof. E. J. Garwood, 315*; Grenzgürtel der nördlichen Kalkalpen. O. Maull, 397*; High-Roads of the. C. L. Freeston, *rev.*, 381, 934; Holidays on High Lands; or Rambles . . . Search Alpine Plants. H. Macmillan, 238*; Jahrbuch des Schweizer Alpenclub, 1900-11, 880*; Journals of Excursions in the Alps: the Pennine, Graian, Cottain, etc. W. Brockedon, 238*; Klubhütten-Album des Schweizer Alpen-Club, 880*; Limite septentrionale de l'olivier dans les Alpes françaises. R. Blanchard, 558*; Lötschberg Tunnel, 528, 689; Neue Studien aus den Alpen. H. Noë, 238*; Aus den nördlichen Kalkalpen. H. v. Barth, 239*; Nouvelle Description des Glacières, . . . qui forment la Grande Chaîne des Alpes de Savoie, de Suisse et d'Italie. (Marc-Théodore) Bourrit, 238*; Nouvelle Description des Vallées de Glace . . . des Alpes, etc. (Marc-Théodore) Bourrit, 237*; Schneegrenze in dem französischen Alpen. Dr. V. Paschinger, 793*; Studien über Gebirgspässe mit besonderer Berücksichtigung der Ostalpen. Dr. J. Sölch, 602; Styrian, Carnac and Julian Alps. J. Ball, 237*; Variations périodiques des glaciers. 1909. Alpes françaises, etc., C. Rabot, 558*; Alpes orientales. Prof. Dr. E. Brückner, 477* ¶Maps of the Alps: Hand und Reise-Karte der Alpen Länder. V. v. Haardt, 234*; Hölzel's Wandkarte der Alpen auf Grundlage der V. v. Haardtschen Karte. Dr. F. Heiderich, *n.*, 79; Maps illustrating "Les Cirques de Montagne" (Alpes fribourgeoises, etc.), 959*; Sketch Map of Four Great "Rockgroups" of. After Prof. Steinmann, 798*; Übersichtskärtchen der nordsteirischen Alpen im Gebiete der Mürz, Mur und Liesing, 878*; Waldgrenzkarte der österreichischen Alpen. Dr. R. Marek, *n.*, 710
- Alsberg, M. Südpolar-Land in seinen Beziehungen zur Verbreitung der Pflanzen und Tiere, 952*
- Altai: Altaiskii Meteorit, 1904 goda [Altai Meteorite.] V. N. Mamontov, 74*
- Altamaha River Drainage Basin, 394*
- Altitude Determination: Periodischen Fehler barometrisch bestimmter Hö-

- henunterschiede in inneren Tropenzone. Dr. Hugershoff, 73*
- Alves Dos Santos, A. Navegação na costa do Rio Grande do Sul, 715*
- Amazon Basin: Ancienne Capitaines de l'Amazone. E. Eude, 476*; Dr. Koch-Grünberg returns to the, 525; Rubber Workers of the. A. Lange, 33
- Amazon River. I. Bowman, 555*; Source of the. Dr. W. Sievers, 197
- Amboyna: Ambonsche Historie. G. E. Rumphius, 224* ¶ Map of Island — and the Moluccas, 472*
- Ambronn, Dr. L. Bericht über die astron. geodät. Ergebnisse der deutsch-französischen Expedition zur Aufnahme des Ostkamerun-Grenzgebietes, 223*; Bericht über die astronom. Ortsbestimmungen . . . Hauptmann Foerster und Oberleut. Schwartz . . . Süden Kameruns ausgeführt haben, 223*
- Ameghino, Dr. Don Florentino, *Obituary*, 921
- America: ¶ Carácter de la Conquista Española en América y en México, según los textos de los Historiadores Primitivos. G. García, 480*; Coconuts in the Americas. C. M. Brown, 313*; History of Coconut Palm in. O. F. Cook, 394*; Economic Importance of the Plateaus in Tropic America. Prof. J. R. Smith, 36; Geol. Work of Ants in Tropical. J. C. Branner, 394*; History of North and South America. From Its Discovery to the Death of Gen. Washington. R. Snowden, 236*; List of Publications, Bureau American Ethnology, 151*; Mémoires philosophiques, historiques, physiques concernant la découverte de l'Amérique. Don Antonio de Ulloa*(1787), 319*; Some Problems of The American Race. W. H. Holmes, 151*; Quelques mots sur la science américaniste au début du XX^e siècle [Amer. Anthropology]. Baron de Borchgrave, 474*; Sponge Industry of the Americas. F. A. Pierce, 553*; Tin Mining in the Americas, 313*; Pan American Railway, 313*; Unternehmen der panamerikanischen Bahn. R. Hennig, 313* ¶ Map: Verbreitung von Steinschleuder und Blasrohr in Amerika, 309*
- Central America: ¶ Studies of Mexican and Central American Plants. J. N. Rose, 636* ¶ Maps of Central America: État actuel des voies ferrées dans l'Amérique Centrale, 634*; Linguistic Map of Mexico and Central America (Bur. of Ethnology). C. Thomas and J. R. Swanton, 706*
- North America: ¶ Abrupt Appearance of Cambrian Fauna on North American Continent. C.D. Walcott, 151*; Bibliography of N. A. Geology for 1909, with Subject Index. J. M. Nickles, 66*; Check-List of N. A. Birds prepared by Committee, Amer. Ornithol. Union, n., 788; Geographical and Comparative List of Birds of Europe and —. Charles Lucian Bonaparte, Prince of Musignano, 320*; Comparison of N. American and European Glacial Deposits. F. Leverett, 317*; Distribution and Migration of North Amer. Shorebirds. W. W. Cooke, 66*; Sur la dernière période glaciaire en Europe et dans l'Amérique du Nord, etc. N. J. Krishtafowitsch, 317*; Nature Sketches in Temperate America. J. L. Hancock, *rev.*, 863; Supplementary Geography. J. F. and A. H. Chamberlain, n., 939; Natural Bridges, with Discussion of their Origin. H. F. Cleland, 474*; Outlines of Geologic History with Especial Reference to, *rev.*, 297; Pleistocene Glaciation of North America viewed in the Light of our Knowledge of Existing Continental Glaciers. W. H. Hobbs, 641; Reisen in den Vereinigten Staaten, Canada und Mexico. J. W. von Müller, 319*; Streifzüge durch das nordamerikanische Wirtschaftsleben. Dr. E. Schultze, *rev.*, 531; On Symmetric Arrangement in the Elements of the Paleozoic Platform of. R. Ruedemann, 221*; Synthesis of Paleogeography of. E. Suess, 635*; Travels through . . . 1825 and 1826. Bernhard, Duke of Saxe-Weimar Eisenach, 318* ¶ Maps of North America: Distribution of Muskrats as Known at Present, n., 546; Glaciated Areas in — and Europe, 959*; Goode's Base Map, n., 712; North America (Oxford Wall Maps), n., 80; Persistence of Idea of North America as a Group of Islands, 1502-1622, 799*; Map of — showing interlapping late Black River and early Trenton Invasions from the Arctic, Atlantic, Gulf of Mexico and Pacific Sides, 954*; Physical Map of, *rev.*, 799; U. S. Biol. Survey, Fourth Provisional Zone Map. C. H. Merriam, V. Bailey, and Others, 707*; Sailing Chart of Northwest Coast from San Francisco to Bering Sea, (Chart U. S. Coast and Geod. Sur.), 545*

- South America: ¶ Across South America. H. Bingham, *rev.*, 694; Amérique latine d'aujourd'hui. H. Lorin, 222*; Estudio geológico de nuestro continente. A. A. Romero, 950*; Great States of —. Condition and Resources, etc. C. W. Domville-Fife, *rev.*, 459; Mesure d'un Arc de Méridien Équatorial en Amérique du Sud. Mission du Service Géog. de l'Armée. Angles Azimutaux, 555*; Zoologie, 636*; 868*; Zur Völkerkunde Südamerikas. O. von Buckwald, 475* ¶ Maps of South America: Eduard Graf v. Wickenburgs Reisen in Südamerika, 1907-10, *n.*, 78; Goode's Base Map, *n.*, 712
- American Antiquarian Society. Handbook of Information, 789*
- American Bison Society, Reports of, 222*
- American Geographical Society: ¶ Annual Meeting, 130; Annual Report, 131; Award of Society's Medals, 51, 283; Educational Exhibition, 518; Honorary and Corresponding Members and Fellows of —, 1911, 605; New Home of the, 481; Transactions, 51, 130, 195, 283, 365; Transcontinental Excursion of 1912, 775
- American Geographers. See Association of.
- Américanistes, Le XV^e Congrès International des. Dr. Capitan, 228*
- Amerind. See Indian, American.
- Amery, L. S. Attempt on Mount Robson, 222*
- Amundsen, Capt. R., Base of Operations in the Antarctic, 690; Dr. Nansen explains —'s Advent in the Antarctic, 451
- Amur Region, On Perpetual Congelation and Forms of Ice in. [In Russian.] B. Polynoff, 224*; Russian Scientific Expedition to, 289
- Amur, Steamship Service on — and Shilka Rivers, 621
- Anatolia. See Asia Minor.
- Andalusian Cordillera. [In Russian.] B. Dobrynin, 316*
- Andersen, H. C. Rambles . . . Hartz Mountains, Saxon, Switzerland, etc., 400*
- Anderson, R. Geology and Oil Prospects of Reno Region, Nev., 474*; Preliminary Report on Geology and Oil Prospects of Cantua-Panoche Region, Cal., 394*; Two Areas of Oil Prospecting in Lyon Co., W. Nevada, 313*
- Anderson, R. M., Stefánsson and — in the Canadian Arctic, 771; More News from, 920
- Anderson, T. Ascent of Matavanu in Savaii, 225*
- Andes: ¶ Patagonischen Anden zwischen 42. u. 44. Grade s. Breite. Dr. P. Krüger, 949*; Prof. F. Kühn in the, 524; Eine Reise über die Anden. Dr. A. N. Schuster, 868*; Beiträge zur Kenntnis der Argentinischen Cordillere. F. Kühn, 555*; *rev.*, 847; Vorkordillere zwischen Mendoza u. Jachal F. in Argentinien. Dr. R. Stappenbeck, 950*; Vorläufiger Bericht über die Resultate der Juncal-Expedition in den Anden. Dr. F. Reichert, 868*
- Andonara en Lomlem, Beschrijving der Eilanden — behorende tot de Solor-Groep. J. D. H. Beckering, 638*
- Andrew, A. R. P. et T. E. G. Bailey. Carte géol. du Nyassaland, 708*
- Andrews, C. C. Prevention of Forest Fires in Minnesota, 474*
- Andrews, E. C. Excursion to the Yosemite, or Studies in the Formation of Alpine Cirques, "Steps" and Valley "Treads," 553*; Geographical Unity of Eastern Australia in Late and Post Tertiary Time, with Applications to Biological Problems, 718*
- Andrews, R. C. Shore Whaling: A World Industry, 872*
- Angola, Map of: Portugiesische Grenzgebiet gegen Deutsch-Südwestafrika zum Verfolg der militär. Operationen im Distrikt Huilla, 547*
- Anhalt, Provinz-Sachsen und Mark Brandenburg, Verbreitung der Salzflora in. (Map), 958*
- Animals, Domestic: Distribution géographique des races antiques parmi les animaux domestiques. Dr. C. Keller, 74*
- Anir Inseln. (Feni-Inseln, Wöneram Insel), Map. Dr. K. Sapper, *n.*, 232
- Angogel und Hochalmspitze, Talstudien im Gebiete des —. Prof. Dr. E. Stummer, 477*, Map, 233*
- Annals of the Association of American Geographers, 365
- Annam, Life in. Madame G. M. Vassal, 717*
- Annaratone, C. A. In Abissinia, 869*
- Anna See, Szent. (St.), Isohypsenkarte der Umgebung des, 957*
- Annoni, A. M. Tre giorni a Malta, 398*
- Anstey, T. C. Crime and Government at Hong Kong, 236*

- Antarctic. See also Polar: ¶ Descriptive: Antarctic Land of Victoria. From Voyage of "Discovery." M. Zimhmann, 478*; Hudson Land. E. S. Balch, 445; Ice Masses on and about the Antarctic Continent. W. H. Hobbs, 398*; Schelfeis der Antarktis am Gaussberg. E. V. Drygalski, 478*; Südpolar-Land in seinen Beziehungen zur Verbreitung der Pflanzen und Tiere. M. Alsberg, 952* ¶ Expeditions: Antarctic Agreement, 57; Antarctic Expeditions, 690; Australasian — Expedition. Dr. D. Mawson, 872*; Australian — Expedition to Explore Wilkes Land, 138; Deutsche Antarktische Expedition, 794*; — W. Filchner, 228*; Weitere Mitteilungen über die geplante —. W. Brennecke, 227*; Capt. R. F. Scott sails for the Antarctic, 57; Japanese Expedition, 291, 529; Dr. Mawson's Expedition, 921; Contributions to the —, 860; Expédition antarctique française 1908-10. Dr. J. B. Charcot, 559*; Le Pourquoi Pas? dans l'Antarctique, 1908-10. Dr. J. B. Charcot, 719*; Second French Antarctic Expedition. Dr. J. B. Charcot, 639*; Voyage of the "Why Not," 1908-10. Dr. J. Charcot, English version by P. Walsh, *rev.*, 865; Dr. Nansen explains Amundsen's Advent in the, 451; Amundsen's Base of Operations, 690; Fram Returns to Buenos Aires, 528; Sir Ernest Shackleton and Wilkes Land, 58 ¶ Explorations and Scientific Results of: Die Asciden der Deutschen Südpolar-Expedition, 1901-3. Zoologie. Dr. R. Hartmeyer, 800*; British Antarctic Expedition, 1907-09. Reports scientific investigations. Vol. 1. Biology. J. Murray, Editor, *rev.*, 145, Scientific Work of — 1907-9. J. Murray, 72*; Tidal Observations of the —, 1907. Sir George Darwin, 398*; Charcot's Antarctic Explorations. E. S. Balch, 81; Expédition du Dr. Charcot. Principaux Resultats d'océanographie physique. J. Rouch, 872*; Relaciones preliminares de los Trabajos ejecutados en la Antartica por la misión á órdenes del Dr. Charcot 1908-10, 710*; Dr. Mawson's Plans of Exploration, 370; Ozeanographische Arbeiten der Deutschen Antarktischen Exped. Dr. W. Brennecke, 952*; Shackleton's Südpolarexpedition und ihre Ergebnisse. O. Baschin, 227* ¶ Meteorology: Antarctic Geology and Polar Climates. W. M. Davis, 478*; Interdiurnal Variability of Temperature in Antarctic and Sub-Antarctic Regions. R. C. Mossman, 58; Meteorology in Weddell Quadrant during 1909. R. C. Mossman, 72*; National Antarctic Expedition, 1901-4. Meteorology, Part 1. Observations at Winter Quarters, etc., *rev.*, 146; The Present Position of — Meteorology. R. C. Mossman, 228* ¶ Maps of the Antarctic: Carte provisoire de l'Antarctique sud-américaine. M. Bongrain, facing p. 81; South Polar Regions. With Antarctic Continent drawn to illustrate the probable topography from present available data. Dr. D. Mawson, *n.*, 712; Sketch Map of Northern Peninsula of West Antarctica, 879*; Supposed Antarctic Continent, Dr. D. Mawson, *n.*, 712; Three Maps of adjoining parts of the Ross and Weddell Quadrants, *n.*, 712; West Antarctica. Maps . . . French Antarctic Exp. 1908-10, *n.*, 393
- Anthon, C. Classical Dictionary . . . of the Greeks and Romans with account of coins, weights and measures, etc., 320*
- Anthropogeography. See under Geography.
- Anthropology: ¶ Anthropology. W. Crooke, 72*; History of —. A. C. Haddon, and A. H. Quiggin, *rev.*, 543; Kunst und Völkerentwicklung . . . Früh und vorgeschichtliche Kultur, usw. Dr. G. Wilke, *n.*, 216; Linguistische Probleme in ethnol., anthrop. und geogr. Beleuchtung. Dr. A. Dirr, 318*; Mitteilungen der Anthropol. Gesellschaft in Wien, 316*; Morals of Uncivilized People. A. L. Kroeber, 399*; Notes on Anthropological Problems and Their Social Applications, 479*; Quelques mots sur la science américaniste au début du XX^e siècle. [Amer. Anthrop.], Baron de Borchgrave, 474*; Recent Discoveries Bearing upon Antiquity of Man in Europe. G. G. MacCurdy, 477*; Recherches anthropologiques sur la Basse-Californie. Dr. P. Rivet, 635*; Stellung der Pygmäenvölker in der Entwicklungsgeschichte des Menschen. P. W. Schmidt, 479*; Die Wurzeln der Kapholländischen Volksüberlieferungen. F. T. Schonken, 72*
- Antilles, Lesser: Colonization of the Caribbean. F. Cundall, 395*
- Ants, Geologic Work of. Prof. J. C. Branner, 293
- Anufrief, I. Winds and Ice in the

- White Sea and Novaya Ziemla in 1910, 559*; Winter in Novaya Ziemla in 1909-10, [In Russian], 639*
- Apalachicola R. Drainage Basin, 394*
- Apennines: ¶ Appennino settentrionale e centrale. F. Sacco, 793*; Studien in den Kalkmassiven des. Dr. A. Rühl, 639* · ¶ Map of Apennines: Schizzo geotettonico dello Appennino settentrionale e centrale secondo i rilevamenti geol. di F. Sacco, 311*
- Appalachian Mountain Club, Register of — for 1911, 789*
- Appalachian Region: ¶ Comparison of Trans-Appalachian Railroads. A. E. Parkins, 314*; Denudation and Erosion in southern — and Monongahela Basin. L. C. Glenn, 553*, 635*; — Forests, 789*; ¶ Maps of Appalachians: Drainage Basins of Southern, 229*; Map showing troughs and principal lines along which stratigraphic overlaps are common, 954*; Map of Southern — Valley showing Outcrops of Ordovician Rocks, 954*
- Appellöf, Dr. A. Untersuchungen ueber den Hummer, 317*
- Arabia: ¶ Geographische Bedeutung der Araber. E. Banse, 155*; Geology of Aden Hinterland. Capt. R. E. Lloyd, 70*; Dr. Musil's Explorations in, 137 · ¶ Map of Arabia: Map of N. E. — showing routes of Capt. G. E. Leachman, 1910, and other explorers, 392*
- Aragon: Barrancos et Cuevas. L. Briet, 719*
- Aral-See, Der. S. Sowetow, 155*
- Aramaic Inscriptions, Glossary of the. S. A. Cook, 320*
- Ararat: Poiezdka na Ararat [A trip to]. J. Leclercq, 70*
- Arber, E. H. N. Natural History of Coal, *n.*, 937
- Arbuckle Mts., Okla., Report on Geological and Mineral Resources of. C. A. Reeds, 880*
- Archæology: ¶ Archæology of Delaware Valley. E. Volk, 800*; Conférence du P. Scheil de l'Institut sur les fouilles et l'histoire de la Babylonie, de l'Assyrie et de l'Elam, 791*; Cyzicus. Account of History and Antiquities . . . Adjacent District, etc. F. W. Hasluck, *n.*, 930; Egypt Exploration Fund. General Index to Archæological Reports, Vols. I-XVIII, W. L. Nash, Compiler, 960*; Entdeckung des bei Homer erwähnten Räucheraltarplatzes der Aphrodite in Paphos auf Cypern. Dr. M. Ohnefalsch-Richter, 317*; Explorations in the Department of Peten, Guatemala. Tikal. Report of Explorations. T. Maler, 949*, Preliminary Study of Prehistoric Ruins of. A. M. Tozzer, 949*; H. I. Smith to Conduct Archæological Survey of Canada, 861; Karanög. The Romano-Nubian Cemetery. C. L. Woolley and D. Randall-MacIver, *n.*, 388; La Scava; or, Some Account of Excavation of a Roman Town on the Hill of Châtelet, etc. [Stephen Weston], 239*
- Arcin, A. Chemin de fer de la Guinée française, 716*
- Arctic. See also Polar: ¶ Descriptive: Das arktische Gebiet als Entwicklungszentrum. Th. Arldt, 227*; Arctic Tides. Dr. R. A. Harris, 202; Grinnell Land. Remarks on English Maps of Arctic Discoveries, 1850-51, etc. P. Force, 400*; Ice in Arctic Seas in 1910, 200; Oceanography of the Sea of Greenland. D. Damas, 479*; The Toll of the Arctic Seas. D. M. Edwards, *n.*, 786 · ¶ Expeditions: Capt. Bernier's Return from, 920; Expedition to Crocker Land, 691; — to Jan Mayen, 451; Jan Mayen Expedition of 1911. W. S. C. Russell, 881; Kaptajn Einat Mikkelsen's Ekspedition. Lieut. W. Laub, 228*; Leffingwell on the Arctic Coast, 528; Peary Arctic Club Expedition to the North Pole, 1908-9. R. E. Peary, 72*; Project of a Spanish Polar Expedition, 859; Zeppelin-Studienfahrt nach Spitzbergen und ins nördliche Eismeer, 1910. Dr. E. v. Drygalski, 398* · ¶ Explorations and Scientific Results of: Disappearance of Ancient Icelandic Colony of Greenland, 920; Expédition danoise de Mylius Erichsen à la côte nord-est du Groenland. Lieut. Trolle, 559*; History and Field Work of Peary Arctic Club. H. L. Bridgman, 872*; Hydrographische Beobachtungen der schwedischen Expedition nach Spitzbergen. A. C. Reichard, 872*; Notes on Early American Arctic Expedition. H. G. Bryant, 872*; Polar Regions showing Routes and Explorations of R. E. Peary, from 1892-1906, 712*; Rapport sur l'expédition polaire néerlandaise qui a hiverné dans la mer de Kara en 1882-83. M. Snellen et H. Exama, *rev.*, 146; *Scottish Exploration in Prince Charles Foreland 1906-7. W. S. Bruce, 872*; Stefánsson and Anderson in the Canadian Arctic, 771 · ¶ Maps of the Arctic: Carte indiquant la position de l'Isthme unis-

- sant l'Île Clavering au Continent, 712*; Cotidal Lines for Arctic Regions. Polar Projection. R. A. Harris, 312*; Die wichtigsten Nordpolarreisen des XIX u. XX Jahrhunderts . . . besonderer Berücksichtigung . . . Erreichung des Pols war. P. Sprigade u. M. Moisel, *n.*, 234
- Arctic Ocean, Cruise of Revenue Steamer Corwin in Alaska and the N. W. — in 1881. I. C. Rosse, J. Muir et al, 720*
- Argand, E. Une Vallée tectonique. Doire Baltée en aval d'Aoste, 478*
- Argentina: ¶ Argentina and her People of To-day. N. O. Winter, *rev.*, 625; — Studied from Physical Point of View. F. Latzina, 395*; Artesian Water Possibilities in, 135; Beiträge zur Kenntnis der Argent. Cordillere. F. Kühn, 555*; *rev.*, 847; Beiträge zur Kenntnis des Quebrachogebietes in — und Paraguay. Dr. R. Lütgens, 715*; Carte de la région des marais du Rio Pilcomayo et du Rio Confuso. A. Schmied et Arnold, 67*; Climate of. W. G. Davis, 314*, *rev.*, 533; Exploración y estudio de la laguna Iberá, 950*; Frontera Argentino Brasileña, 868*; Información descriptiva sobre la provincia de San Juan. J. Campbell, 715*; Penitentesschneefelder Gebiet zwischen Aconcagua und Tupungato. Dr. F. Reichert, 475*; República —. E. G. A. de Correa-Morales, 868*; Ricordo Commemoraz. Centenaria della Indipendenza della Repubblica, 67*; Unterricht der Geographie in Argentinien und seine Ausdehnung. E. G. A. de Correa Morales, 868* ¶ Economic and Commercial: Agricultural and Pastoral Census of Stock Breeding and Agriculture in 1908, 314*; Agrology of. P. Lavenir, 395*; Cultivation of Plants for Industrial Purposes. C. D. Girola, 314*; Cultivation of Trees in. F. Maudit, 314*; Dairy Industry. Dr. E. Fynn, Jr., 314*; Estancias in. G. Daireaux, 314*; Evolution of Live Stock Breeding in. H. Gibson, 314*; Industria Lechera en la República Argentina, 640*; Milling Industry. E. Lahitte, 314*; Meat Industry of. R. Pillado, 314*; Notes . . . Agricultural and Pastoral Flora of. C. Spezzini, 314*; Tierras fiscales de la colonia Caroya. G. Vitoria, 868*; Trade, Past and Present. F. Latzina, 314*; Wine Growing Industry in. R. Palencia, 314* ¶ Maps of Argentina: Croquis-Itinerario desde Rosario de Lerma hasta Cachi. — F. Kühn, 471*; Demarcación de Límites con Chile. Region de la Puna. Z. Sánchez and T. Loos, 955*; Distribution of hydro-metric stations, 1909, 231*; Distribution of meteor. stations, 1909, 231*; General Map of, *n.*, 231; Hypsometric map, *n.*, 231; Map of Railways in 1909, 231*; Vorkordillere zwischen den Flüssen Mendoza und Jachal. Dr. R. Stappenbeck, 707* (Argyll), [The Duke of]. The Glacial Theory, 239*
- Arisaig-Antigonish District, Nova Scotia. M. Y. Williams, 949*
- Arizona: ¶ Black Mesa Coal Field. M. R. Campbell and H. E. Gregory, 867*; Caves and Ruins of — and Colorado. C. Hallock, 394*; Coal Deposits near Pinedale, Navajo Co. A. C. Veatch, 867*; History of the Grand Canyon District. Prof. D. W. Johnson, 285; Meteor Crater in northern Central. D. M. Barringer, 788*; Prel. Report on a Visit to the Navaho National Monument. J. W. Fewkes, 788*; Reconnaissance of the Ore Deposits in Northern Yuma Co. H. Bancroft, 947*; Single Cycle Development of the Grand Canyon of the Colorado. H. H. Robinson, 948* ¶ Maps of Arizona: Bisbee Quad, 75*; Geol. Map of Part of N. W. New Mexico and N. Arizona. N. H. Darton, 157*; Map of Black Mesa Coal Field. M. R. Campbell, 630*; Parker Quad, 629*; Pinedale Coal Field, Navajo Co. A. C. Veatch, 630*; Ray Quad, 75*; Sketch Map of Navaho National Monument. W. B. Douglass, 632*; Territory of Arizona, *n.*, 795
- Arkansas: ¶ Recently Discovered Hot Springs in. A. H. Purdue, 867* ¶ Maps of Arkansas: Production of cotton in 1909, 229*; Slate Area of, 229*
- Arldt, Th. Das arktische Gebiet als Entwicklungszentrum, 227*
- Armagnac et les pays du Gers. G. Laurent, 718*
- Arnold, *joint author*, see A. Schmied.
- Arou et Kei, Iles. [New Guinea.] Dr. J. Roux, 156*
- Arrhenius, Dr. Svante, Personal, 294
- Arthauer, O., and Lieut. Kraft's Expedition to Sahara, 55
- Art: Kunst und Völkerentwicklung. 1 Heft. Spiral-Mäander-Keramik und Gefäßmalerei Hellenen und Thraker. Früh und vorgeschichtliche Kultur, usw. Dr. G. Wilke, *n.*, 216

- Aryans: Die Indogermanen. Dr. O. Schrader, *rev.*, 943
- Ashanti, Gold Coast and — Mapping the. Maj. F. G. Guggisberg, 791*; Sketch Map of, *n.*, 78
- Ashley, G. H. Stratigraphy and Coal Beds of Indiana Coal Field, 221*
- Ashmead, P. H. Madeira-Mamoré Railway, 636*
- Ashmead, Wm., N. Banks, D. W. Coquillett, *et al.*, Insects (Harriman Alaska Series), 480*
- Asia: ☞ Beziehungen zwischen tektonischen und seismischen Verhältnissen Ostasiens. Dr. E. Rudolph, 70*; Eastern Asia. A History. I. C. Hannah, *rev.*, 943; Empires and Emperors of Russia, China, Korea and Japan. Count Vay de Vaya and Luskod, 319*; Fortschritte der geographischen Forschungen im Asien im Jahre 1910. Dr. F. Macháček, 717*; Mantle of the East. E. Candler, *n.*, 65; Südost-Asien bei Ptolemäus. W. Volz, 315*; The West in the East from an American Point of View. P. Collier, *rev.*, 932 ☞ Maps of Asia: Goode's Base Map, *n.*, 712; Meteorological Maps, 879*; Der Orient. E. Banse, *n.*, 78; Physical Wall Map. M. Kuhnert and Dr. G. Leipoldt, *n.*, 235
- Central Asia: ☞ Asia Centrale. Note di viaggio . . . giapponese. N. Tocugirō. Traduzione di L. Nocentini, *rev.*, 304; — and Tibet. S. Hedin, 237*; Évolution du Relief de l'Asie Centrale. E. de Martonne, 557*; Flüchtige Reiseeindrücke aus dem Innern und von den Rändern Asiens. Prof. Dr. E. v. Romer, 637*; Irrigation dans l'Asie Centrale et la migration des peuples. Dr. J. de Chelnoky, 870*; Trois ans de mission dans la Haute-Asie. P. Pelliot, 557*
- Asia Minor: ☞ Fringe of Verdure Around Asia Minor. E. Huntington, 70*; Sur les grandes routes de l'Asie Mineure. J. de Nettancourt-Vaubecourt, *n.*, 65; Karst Country of Southern Asia Minor. E. Huntington, 91; Kartographie des nordwestlichen Kleinasien. Oberst v. Diest, 870*; Meine Expedition durch Vorder-Asien (Klein-Asien, usw.). Dr. H. Grothe, 870*; Noticia de una exploración geográfica y arqueológica en el Norte del Asia Menor. D. J. A. Weissberger, 224*; Reisen und Forschungen im westlichen Kleinasien. Das westliche Mysien und die pergamenische Landschaft. Dr. A. Philippson, 951* ☞ Maps of Asia Minor: Geol. Karte des westlichen Kleinasien. A. Philippson, 708*; Topographische Karte des westlichen Kleinasien nach Aufnahmen auf Reisen die mit Mitteln des Kais. Deutschen Archäol. Instituts . . . ausgeführt sind. Dr. A. Philippson, *n.*, 548
- Russia in Asia: ☞ Baumwollerte 1910 in Mittelasien, 717*; Colonisation russe en Asie. D. Aitoff, 637*
- Turkey in Asia: ☞ Conférence du P. Scheil de l'Institut sur les fouilles et l'histoire de la Babylonie, de l'Assyrie et de l'Elam, 791*; Geographische Charakterbilder aus der asiatischen Türkei und dem südlichen mesopot. — iranischen Randgebirge (Puscht-i-küh). Dr. H. Grothe, *n.*, 65; Au pays du chemin de fer de Bagdad. H. Viollet, 951* ☞ Maps of Turkey in Asia: Eastern Turkey, Syria and Western Persia, *n.*, 160; Map showing . . . Gertrude Bell's Route from Aleppo to Konia, 957*; Kartenskizze der antiken Ruinenorte in der Umgebung von Báalbek, 798*; Zweite Reise in der Asiatischen Türkei 1899 von Dr. M. Fr. v. Oppenheim. Báalbek nach Haleb, 798*
- Asmara. M. Checchi, 223*
- Assam: ☞ Some coal-fields in north-eastern —. H. H. Hayden, 477*; The Naga Tribes of Manipur. T. C. Hodson, *rev.*, 698 ☞ Map of Assam: Geol. Sketch Map showing distribution of coal fields of the Naga Hills, 232*
- Assam-Tibet Borderland, murder of N. Williamson in, 686
- Asselin, H. Cité chinoise de Tchen-tou, ville principale du Se-Tchouen, 792*
- Assereto, Prof. G. Commercio e l'industria dei prodotti forestali in Italia, 227*
- Association of American Geographers, *Annals of the*, 365; Seventh Annual Meeting, 196
- Assyria: Conférence du P. Scheil de l'Institut sur les fouilles et l'histoire de la Babylonie, de l'Assyrie et de l'Elam, 791*; Map, 549*
- Astrographical: Theorie der astrographischen Ortsbestimmung. L. de Ball, 72*
- Athabaska and Saskatchewan Rivers, At the Sources of. Lecture by Mrs. C. Schaeffer, 195
- Athens: Latitude et longitude d'Athènes. D. Eginitis, 73*
- Atlantic Coast: ☞ Study of Shoreline Changes Along the, 447; Subsidence

- of. T. I. Casey, 953* ¶ Chart of the Atlantic Coast from Cape Henry to Cape Lookout, 309*
- Atlantic Deeper Waterways Association, Report of Proceedings, 1909, 635*; Summary of Papers on Subject with Statistics of Coastwise Commerce, 635*
- Atlantic Ocean: ¶ Bedeutung einer internationalen Erforschung des in physikalischer und biologischer Hinsicht. Dr. G. Schott, 74*; Commission Internationale pour l'exploration scientifique de. Prof. A. Berget, 73*; Luftdruckverteilung über Atlantischen Ozean und Bedeutung der drahtlosen Telegraphie für Erweiterung der täglichen Wetterkarten. Dr. Polis, 74*; "Michael Sars" North Atlantic Deep-Sea Expedition, 1910. J. Hjort, 720*; Passatwinde des Atlantischen Ozeans. Dr. Mey, 640*; Seismische Verhalten des — und Pazifischen Ozeans. Dr. G. Gerland, 73*; Températures de l' — Nord (Surface et Profondeurs). A. Hautreux, 640*; Wodurch ist die hohe Wärme Europas und des Nordatlantischen Ozeans bedingt. W. Köppen, 638* ¶ Maps and Charts of the Atlantic Ocean: Campagne scientifique de la Princesse Alice, 234*; Courbes de température dans l' — Nord pendant 29 juillet-9 août, 1910; Courbes de température moyenne pendant le mois d'août, 879*; Distribution de la Température . . . à l'époque du frai des principales Gadides. M. I. N. Nielsen, 960*; *Gadus Poutassou*. Carte montrant la différence d'extension entre la zone où fraie une espèce et son aire de distribution, 960*; Verbreitung der Atlantischen Süßwasser-Aale, *n.*, 798
- ¶ U. S. Hydrographic Office Charts: Pilot Charts of the North Atlantic Ocean, 76, 158, 229, 389, 470, 545, 632*; Pilot Charts of the South Atlantic Ocean, 158, 470* ¶ U. S. Weather Bureau Charts: Meteorological-Charts of the North Atlantic, 158, 229, 389, 632; Meteorological Charts of the South Atlantic, 158, 389*
- Atlantic and Pacific Transport Co., 778
- Atlases: ¶ Atlante geografico muto, fisico-politico, *n.*, 393; Atlas général Vidal-Lablache, *n.*, 312; Atlas historique ou nouvelle Introduction à l'histoire, etc. (1705), 720*; Atlas, Lernbuch und Schüller. Dr. H. Degel, 399*; Atlas of Portolan Charts. Edited by Dr. E. L. Stevenson, 530; Atlas Universel de Géographie. V. de Saint-Martin et Fr. Schrader. Mon-
 golie, Maroc, Égypte et Soudan Égyptien, 312*; Indo-Chine, *n.*, 552; Geographischer Volksschul-Atlas, usw. J. G. Rothaug, *n.*, 713; Hammond's Pocket Atlas of the World, *n.*, 880; Liste alphabétique des plans et vues de Villes, Citadelles et Fortereses qui se trouvent dans le grand Atlas de Mortier. Édition de Amsterdam 1696. Sir H. G. Fordham, 640*; List of Geographical Atlases in the Library of Congress, *rev.*, 312; Literary and Historical Atlas of Europe, *rev.*, 382; Modern Atlas to accompany Elements of Geography, Ancient and Modern (1819?). J. E. Worcester, 800*; New Edition of the Century Atlas, 692; Prof. A. L. Hickman's geographisch-statist. Taschen-Atlas von Österreich-Ungarn, *n.*, 80; Stieler's Atlas of Modern Geography. Adapted . . . English-speaking public. B. V. Darbishire, Ninth Ed., *n.*, 235; O 2° Visconde de Santarem e os seus Atlas Geographicos. J. A. de Freitas, *n.*, 215
- Atmosphere. ¶ Beschaffenheit der oberen Schichten unserer Atmosphäre. O. Baschin, 953*; "Centers of Action" and Seasonal Weather, 371; Drachenbeobachtungen an Bord "de Ruyter" angestellt vom A. E. Rambaldo während der Fahrt nach Ost-Indien und . . . W.-Indien, Dez.-Juli, 1909. Dr. E. van Everdingen, 720*; État de l'atmosphère marine par sondage aériens Atlantique moyen et région intertropicale. L. Teisserenc de Bort et A. L. Rotch, 560*; Fortschritte in der Erforschung der freien Atmosphäre während des letzten Dezenniums. A. Peppler, 953*; Luftbahnen am Erdboden und in der freien Atmosphäre. W. Köppen, 317*; Upper Air. E. Gold and W. A. Harwood, 479*
- Atmospheric pressure: ¶ Über Abhängigkeit einiger geographischen Elemente von dem barischen Relief der Erdoberfläche. Prof. P. Brounow, 73*; On Relation between Atmospheric Pressure and Wind. J. W. Sandström, 872*; Unperiodische Temperaturschwankungen im Golfstrom und deren Beziehung zu der Luftdruckverteilung. J. Petersen, 317*; Zusammenhang zwischen Temperaturverhältnissen der Atmosphäre und dem Druck an Erdoberfläche. Prof. W. Trabert, 74*
- Atolls, Coral and —. Their History, Description . . . Influence of Winds,

- Tides and Ocean Currents on their Formation, etc. F. Wood-Jones, *rev.*, 944
- Aubin, E. En Haïti, Planteurs d'autrefois, Nègres d'aujourd'hui, *rev.*, 300
- Aubury, L. E. General Index to Publications of Cal. State Mining Bureau, 960*; Mineral Productions, County Maps and Mining Laws of, Cal., 960*
- Audibert, A. Cuestión de Límites entre el Paraguay y Bolivia, 720*
- Auin, Die. Ein Beitrag zur Buschmannforschung. H. Kaufmann, 154*
- Ault, J. P. Daylight Observations on Venus, 767
- Austin, Texas, Map of vicinity of, 229*
- Australasia, Map of: Goode's Base Map, *n.*, 712
- Australia: ¶ Australia: The Making of a Nation. J. F. Fraser, *rev.*, 379; In the — Bush and on the Coast of Coral Sea, etc. R. Semon, 237*; An Australian Meteorite. L. L. Smith, 156*; Bananas in Tropical —, 289; Biographical Sketch of Col. W. Light, the First Surveyor of —. T. Gill, 718*; Colonisation des Régions tropicales. Exemple de l'Australie, 397*; Contributions to the Flora of. A. J. Ewart, 156*; Fisheries, 557*; Further Notes on Burial Customs. R. H. Mathews, 156*; Distribution of Land-Birds. R. Hall, 871*; Geographical Unity of Eastern — in Late and Post Tertiary Time, with Applications to Biological Problems. E. C. Andrews, 718*; Gli Italiani in. Dr. G. Capra, 871*; Meteorology of, 138, 369; Physiographic and Economic Aspects. G. Taylor, *n.*, 539; Sir Joseph Banks: The "Father of Australia." J. H. Maiden, *rev.*, 141; Year-book of — for 1911, 800* ¶ Maps of Australia: Sketch Maps to illustrate paper on "Flowing Wells of Central Australia," 798*
- South Australia: ¶ Allegemeine-Verhältnisse der Häfen an der Südküste von Süd-Australien, 156* Map of South Australia: ¶ Geol. Sketch Map of Country along Route of Proposed Trans-Continental Railway, C. G. Gibson, *n.*, 311
- Western Australia: ¶ Canning's Expeditions in, 952*; Geology and Ore Deposits of West Pilbara Goldfield. H. P. Woodward, 638*; Geological Observations in the country between Wiluna, Hall's Creek, and Tanami. H. W. B. Talbot, 477*; Irwin R. Coalfield, and adjacent districts. W. D. Campbell, 557*; Notes on an Expedition into the interior of. S. Weston, 156*; Official Guide of, *n.*, 211; Report by Surveyor-General for 1910, 397* ¶ Maps of Western Australia: Geological Sketch Map of — H. P. Woodward, *n.*, 473; Geol. Sketch Maps of the Country along the Route of Proposed Trans-Continental R. R. C. G. Gibson, *n.*, 311; The Country between Arrino and Northampton. W. D. Campbell, 232*; Portions of Eastern Division traversed by the Canning Survey party, 1907-9, from Wiluna to Hall's Creek, 232*; — and West Pilbara Goldfield, H. P. Woodward, *n.*, 473; Wiluna-Kimberley Stock Route by A. W. Canning, 798*
- Austria-Hungary. See also Hungary: ¶ Bergstürze des Mai 1910 in der Umgebung von Scheibbs. Dr. G. Götzinger, 71*; Bohemia and the Čechs. History, People . . . Accounts of Moravia and Silesia. W. S. Monroe, *n.*, 144; Gletscherbeobachtungen in Selrain und nördlichen Stubai 1909. Dr. M. Lagally, 477*; Jahresbericht für 1910 [Review of geol. field laboratory work, map production, etc.] Dr. E. Tietze, 792*; Mitteilungen des k. u. k. Militärgeograph. Institutes, 558*; Oesterreichisches Seebuch, etc. H. Noë, 238*; Population (Census, 1910), 621; ¶ Maps of Austria-Hungary: Carte des environs de Titel, 957*; Les environs du confluent du Danube et de la Tisza, Carte morphologique, 957*; Geographischer Volksschul-Atlas, usw. J. G. Rothaug, *n.*, 713; Geol. Map of Environs of the Spa of Stubice Toplice, 473*; Geol. Map of Vostry Fault Region, 473*; G. Freytag's Automobil- und Radfahrer-Karten, 79*; Karte der politischen Bezirke Hietzing-Umgebung, *n.*, 233; Karten zur Ergänzung der Triaskarte. Slowakien, Galizien, Bukowina, Deutschböhmen, usw. H. Hanau, 233*; Maps illustrating "Les Cirques de Montagne." Tatra. M. Koncza, 958*; Plateau des Zahmen-Kaisers, 878*; Prof. A. L. Hickman's geographisch - statist. Taschen - Atlas, *n.*, 80; Triaskarte der Habsburger Monarchie. H. Hanau, *n.*, 233; Übersichtskarte der nördsteirischen Alpen im Gebiete der Mürz, Mur und Liesing, 878*; Verkehrs-Karte von Österreich-Ungarn, *n.*, 233; Waldgrenzkarte der Österreichischen Alpen. Dr. R. Marek, *n.*, 710

- Aviation. See Aeronautics.
- Aymard, Capitaine. *Les Touareg de la région de Tombouctou*, 223*
- Axenfeld, K. *Wie evangelische Missionare unsere Neger arbeiten lehren*, 637*
- Axerio, E. *Brasile. Lo Stato di Goyaz*, 715*
- B.
- Babcock, K. C. *Scandinavian Element in American Population*, 394*
- Babylonia: ¶ *Conférence du P. Scheil sur les fouilles et l'histoire de la Babylonie, l'Assyrie et de l'Elam*, 792*; *Die künstliche Bewässerung Babylonien*. K. Ch. Christiansen, 155* ¶ *Map of: Carte des principales Fouilles de Babylonie, Assyrie et Elam*, 549*
- Bacchiani, Prof. A. *Giovanni da Verazzano and His Discoveries in North America . . . according . . . Cellere Codex of Rome, English Version by E. H. Hall*, 221*
- Bach, Dr. H. *Klima der Schweiz*, 316*
- Backhouse, E., *joint author*, see J. O. P. Bland.
- Bacot, J. *À travers le Tibet oriental*, 718*; *Map*, 550*
- Baden; *Statistisches Jahrbuch für das Grossherzogthum — 1910-11*, 800*
- Bagagem Valley, Minas Geraes, *Map of*, 955*
- Bagdad, 224*; *Aspect présent de la question du — [Railroad]*. R. de Caix, 637*; *Die Bagdadbahn*, 637*; *Au pays du chemin de fer de*. H. Violette, 951*
- Bahama Islands, *Agricultural Labour and Other Conditions of*. W. M. Cunningham, 554*
- Bahia: ¶ *Geology and Topography of Serra de Jacobina*. J. C. Branner, 476*; *Minerals associated with Diamonds and Carbonados in the State of*. J. C. Branner, 715* ¶ *Maps of Bahia: Map to illustrate paper on the Geography of North Eastern —*. J. C. Branner, 796*; *Sketch Map of Approximate Limestone Areas of the Interior of*. J. C. Branner, 796*
- Bahr el Ghazal (*Mission Tilho*), *Map*, *n.*, 231
- Bailey, J. F. *Introduction of Economic Plants into Queensland*, 225*
- Bailey, T. E. G., *joint author*, see A. R. P. Andrew.
- Bailey, V., *joint author*, see C. H. Merriam.
- Baillie, M. *First Impressions on a Tour upon the Continent in the Summer of 1818, etc.*, 319*
- Bakango, Les. Lieut. A. Hutereaue, 314*
- Baklund, O. O. *Expedition of Kuznezoff Brothers to Polar Ural in 1909 [in Russian]*, 559*
- Balch, E. S. *Charcot's Antarctic Explorations*, 81; *Hudson Land*, 445; *Palmer Land*, 282
- Balkan Peninsula: ¶ *La vie politique orientale en 1909*. Dr. G. Samné et Y. M. Goblet, *n.*, 934. ¶ *Maps of: Carte du Lac Égéen*. J. Cvijić, 710*; *Église catholique dans les Balkans*. R. Hausermann, *n.*, 551; *Les Lacs Égéen et Panhionien au Miocène dans la Péninsule Balkanique*, *n.*, 710
- Ball, J. *Styrian, Carnac, and Julian Alps*, 237*
- Ball, L. C. *Certain Mines and Mineral Fields in North Queensland*, 557*; *Field Notes on Mount Flora Gold and Mineral Field*, 557*; *Geol. Sketch Map of Northern Part of Annan R. Tin Field*, 311*; *Mineral Fields in the Hinterland of Mackay: Mount Spencer, etc.*, 557*
- Ball, Dr. L. de. *Theorie der astrographischen Ortsbestimmung*, 72*
- Ball, M. W., and E. Stebinger. *Eastern Part of Little Snake R. Coal Field, Wyo.*, 474*
- Ball, S. H., and M. K. Shaler. *Mining Conditions in the Belgian Congo*, 153*
- Ballooning: ¶ *Im Ballon über die Jungfrau nach Italien*. G. A. Guyer, *n.*, 946; *Recent European Progress in Dirigible Balloons*. W. A. Blonck, 318*; *Registering —, Ascents*, Dec. 6-11, 1909, and Aug. 8-13, 1910. W. H. Dines, 640*
- Balmat, Jacques, or, *The First Ascent of Mont Blanc. A True Story*. T. L. Oxley, 239*
- Balsam of Peru. *Central American Contribution to Pharmacopœia*. A. Hale, 790*
- Baltic Sea: ¶ *Eisverhältnisse des Winters 1909-10 in ausserdeutschen Gewässern der Ostsee sowie an der holländischen Küste . . . russischen und schwedischen, usw.*, 71*
- Bamboo Pulp as the Paper Material of the Future. H. Vincent, 719*
- Banana and its Relatives. F. Adams, 794*; *Banane und ihre Verwertung als Futtermittel*. Dr. M. Zagorodsky, 952* ¶ *Map: Verbreitung der Bananenkultur*. Dr. R. Rung, 713*

- Bancroft, H. Reconnaissance of the Ore Deposits in Northern Yuma Co., Ariz., 947*
- Bangala. (État Ind. du Congo). *Sociologie descriptive*. C. van Overbergh et Ed. de Jonghe, *rev.*, 303
- Bangweolo: ¶ Sul Lago Bangueolo. Capt. M. Piscicelli, 68* ¶ Map: Sketch Map of S.-E. corner of — Swamps, 956*
- Banks, N., *joint author*, see Wm. Ashmead.
- Banks, Sir Joseph: The "Father of Australia." J. H. Maiden, *rev.*, 141
- Banse, E. Geographische Bedeutung der Araber, 155*; Kurdistan — ein länderkundlicher Begriff, 951*; —'s Reise im nördl. Mesopotamien. 1908, (Map), *n.*, 310
- Bantu Languages. Living Speech in Central and South Africa. Essay Introductory. A. C. Madan, *rev.*, 925
- Baratta, M. Catastrofe sismica Calabria Messinese, *n.*, 145
- Barbados, Agricultural Labour Conditions of. J. R. Bovell, 475*
- Barber, J. W., and H. Howe. Historical Collections of the State of New York, etc., 236*
- Barbey, Albert, Carte —. Chaîne du Mont-Blanc. X. Imfeld et L. Kurz, *n.*, 551
- Barbour, V. Privateers and Privateers of the West Indies, 636*
- Baren, J. van. Morphologische Bau des niederländischen Diluviums nördlich vom Rhein, 71*
- Barker, E. R. Buried Herculaneum, *rev.*, 220
- Barlow, A. E., *joint author*, see F. D. Adams.
- Barneaud, Ed. Le Tunnel du Simplon, 316*
- Barrera, A. Guinea española, 951*
- Barrett, O. W. Impressions and Scenes of Mozambique, 224*
- Barringer, D. M. Meteor Crater in northern central Arizona, 788*
- Barrows, Dr. D. P. Conservation Policy for the Philippines, 477*; Negrito and Allied Types in the Philippines, 397*
- Barrows, H. H., *joint author*, see E. Blackwelder.
- Barth, Dr. C. G. Ueber das Schulwesen unserer Schutzgebiete, 639*
- Barth, H. von. Aus den nördlichen Kalkalpen, 239*
- Bartholomew, J. G. Literary and Historical Atlas of Europe, *rev.*, 382; Map of Mexico, *n.*, 634*
- Baschin, O. Beschaffenheit der oberen Schichten unserer Atmosphäre, 953*; Bibliotheca Geographica. Jahresbibliographie usw., *n.*, 150; Shackletons Südpolarexpedition und ihre Ergebnisse, 227*
- Basel, Temperaturverhältnisse von. W. Strub, 227*
- Basilicata, Danni prodotti dai terremoti nella — e nelle Calabrie. Prof. G. Mercalli, *n.*, 145
- Bassler, R. S. Cement Resources of Virginia west of the Blue Ridge, 880*
- Bastin, E. S. Geology of Pegmatites and Associated Rocks of Maine, 714*
- Batavia, Ethnographica Museum van het Bataviaasch Genootschap van Kunsten en Wetenschappen te. J. W. Teillers, 72*
- Bauer, L. A. Broader Aspects of Research in Terrestrial Magnetism, 317*; Circumnavigation Cruise of the "Carnegie" for 1910-13, etc., 317*; Department of Terrestrial Magnetism, Carnegie Institution, Report for 1910, 479*; Summary of Work — 1910-11, 560*; Gravity Determinations at Sea, 399*; Physical Theory of the Earth's Magnetic and Electric Phenomena. No. IV: Origin of the Earth's Magnetism, 720*; Bauer, L. A. and W. J. Peters. Magnetic Chart Corrections Found on First Cruise of "Carnegie" 1909-10, 317*
- Baulig, H. Écoulement fluvial et dénudation d'après les travaux de U. S. Geol. Survey, 560*
- Bavaria: ¶ Jahresbericht der königlich bayerischen Post und Telegraphenverwaltung für 1909, 227*; Staats-eisenbahn Verwaltung, 1909, 398*; ¶ Map of: Schulwandkarte vom Königreich Bayern. M. Kuhnert, *n.*, 235
- Beaches: Raised Beaches and Head of Cornish Coast. W. Rogers, 316*; Über Stranddünen und ihre Befestigung. W. Stavenhagen, 872*
- Beal, F. E. L. Birds of California in Relation to the Fruit Industry, 221*
- Bealby, J. T. Fruit Ranching in British Columbia, *rev.*, 298
- Bean, R. B. Philippine Types, 397*; Racial Anatomy of the Philippine Islanders, *rev.*, 783; Types of Negritos in the Philippine Islands, 477*
- Beattie, J. C. Report of Magnetic Survey of South Africa, *n.*, 926
- Beaverdell District, West Fork of Kettle R., B. C. L. Reinecke, 949*
- Beazley, C. R. Prince Henry of Portugal and the African Crusade of Fifteenth Century, 317*

- Bechuanaland, Map: Mafeking. Portion of Marico and Lichtenburg Districts, 159*
- Beck, Hon. Adam. Conservation of Water-Powers of Ontario, 475*
- Becker, Prof. F. Kunst in der Kartographie, 73*, 399*
- Becker, F. Neue Anforderungen an das Landesvermessungswesen und an Topographie und Kartographie, 399*
- Beckering, J. D. Beschrijving der Eilanden Andonara en Lomlem, etc., 638*
- Beekman, A. A. Wat de Afsluiting en Droogmaking der Zuiderzee Eigenlijk Betekent, 639*
- Bégin, E. Voyage pittoresque en Suisse, en Savoie et sur les Alpes, 237*
- Belgium: ¶ La Belgique moderne. H. Charriaut, *n.*, 933; Diminution de la natalité en Belgique, 157*; Esquisse de Géographie botanique de la Belgique. J. Massart, *n.*, 144; Mouvement de la population, 792*
- Belin, J.-L. Le Simplon et l'Italie septentrionale, 237*
- Bell, E. Y. Republic of Panama and its People . . . Reference to Indians, 314*
- Bell, G. Map showing Route from Aleppo to Konia, 957*
- Bell, J. M. Physiography of Wellington Harbor, 190
- Belz, J. O., *joint author*, see L. J. Briggs.
- Bencke, A. Tschadsee in Gegenwart und Vergangenheit (Maps), 877*
- Bendrat, T. A. Geologic and Petrographic Notes on the Region about Caicara, 715*, 790*
- Béngal: The Garos. Maj. A. Playfair, *n.*, 65
- Bennett, G. Wanderings in New South Wales, Batavia, Pedir Coast, Singapore and China . . . 1832, 239*
- Bent, A. H. Bibliography of White Mountains, *n.*, 781
- Benue R., Completely explored by Capt. Strumpel, 288
- Bérard, V. Russian Empire and Czarism, 319*; Le Sultan, l'Islam et les Puissances, *rev.*, 699
- [Berchem, J. P. Berthout van]. Itinéraire de la Vallée de Chamonix, d'une partie du Bas-Vaillais et des Montagnes avoisinantes, 320*
- Bergeat, Dr. A. Granodiorita de Concepción del Oro en el Estado de Zacatecas y sus Formaciones de Contacto, 475*
- Bergen, Klima von. Niederschläge, N. J. Föyn, 316*
- Bergeron, F., *joint author*, see C. Dufart.
- Berget, Prof. A. Commission Intern. pour Exploration scientifique de l'Atlantique, 73*
- Bering Sea: Fur Seals of, 286 ¶ Chart: Eastern Part of —. (U. S. Coast and Geod. Surv.), 545*
- Berkey, C. P. Geology of New York City (Catskill) Aqueduct, 553*
- Berlin: ¶ Berlin. Principal centre de la circulation continentale en Europe. Prof. T. Fischer, 558*; Travels from — through Switzerland to Paris in 1804. A. v. Kotzebue, 238*
- Bernard, Lieut. A. Croquis schématique des régions de l'Ouest du cercle de Colomb (Map), 78*; Étude d'une zone frontière. Confins algéro-marocains, 790*; Montagnes d'Algérie, 69*; Notes sur l'Oued Gheris et ses affluents, 476*; L'œuvre française dans les Confins Algéro-Marocains et ses Résultats politiques, 223*; Quelques rectifications à la carte du Maroc. Vallée de la Moulouya, 556*
- Berners Bay Region, Alaska, Geology of. A. Knopf, 635*; ¶ Maps: Geological and Topographical, 228*
- Bernhard, Duke of Saxe-Weimar Eisenach. Travels through North America . . . 1825 and 1826, 318*
- Bernier's Return from the Arctic, 920
- Bertacchi, G., *joint author*, see G. Dalla Vedova.
- Berthaut, Gén. H. Topologie, Étude du Terrain, *rev.*, 361
- Berthaut, L. Agrandissement du Havre, avant-port de Paris, 638*
- Bertrand, A. Dans le Sud-Africain et au seuil de l'Afrique Centrale, *n.*, 927
- Bhutan: Le Bhoutan et son Développement historique. C. E. Bonin, 556*
- Bibliographies. See also Catalogues and Indexes: ¶ Bibliography of Æolian Geology. S. C. Stuntz and E. E. Free, 953; Bibliography of North American Geology for 1909 with Subject Index. J. M. Nickles, 66*; Bibliotheca Geographica. Jahresbibliographie usw. Dr. O. Baschin, *n.*, 150; Brief List of Meteorological Text-Books and Reference Books. C. F. Talman, *n.*, 220; Catalogus der Koloniale Bibliotheek . . . Kon. Inst. voor de Taal, Land en Volkenk. van Ned. Indië. Aanwinsten, 156*; List of Geographical Atlases in the Library of Congress, *rev.*, 312; Liste alphabétique des plans et vues de Villes, Citadelles et Forteresses . . . dans le Grand Atlas de

- Mortier, Édition de Amsterdam, 1696.
 Sir Herbert Fordham, 640*; List of Publications. Bureau Amer. Ethnology, 151*; Recent Bibliography of Caroline Islands, 510; — of Sierra Leone. H. C. Lukach, *n.*, 781; — of White Mountains. A. H. Bent, *n.*, 781; — of Writings of R. E. C. Stearns. M. R. Stearns, 789*; Trees, Forestry and Lumbering. List of Books and of Reference to Periodicals, etc., 952*
 Bickel, F. W. Wirtschaftliche und politische Lage in Britisch-Indien, 870*
 Bieber, F. J. Reise nach Harar und Adis Abeba, 67*
 Biermann, C. Le Jorat. Esquisse géographique, 478*
 Bigelow, F. H. Inversion of Temperature Amplitudes and Departures in the U. S., 221*; Status of Modern Meteorology, 399*; Personal, 54
 Bighorn Basin, Wyo. Coal Field in S. E. Part of. E. G. Woodruff, 152*
 Bigland, J. Geographical and Historical View of the World . . . With Notes by Jedidiah Morse, 239*
 Bingham, H. Across South America, *rev.*, 694; Potosi, 1; Ruins of Choquequirau, 476*, 720*; Yale Expedition to Peru, 287
 Biogeography, Shackleton's Contribution to. C. H. T. Townsend, 479*
 Bird Migration: Bird Migrations and Weather. Dr. W. R. Eckardt, 198; Our Greatest Travelers. Birds that fly from Pole to Pole, etc. W. W. Cooke, 788*
 Birds of Europe and North America, Geographical and Comparative List of. Charles Lucien Bonaparte, 320*
 Birkinbine, J. Our Neighbor, Mexico, 868*
 Birot, J. Statistique annuelle de Géographie comparée, *rev.*, 466
 Bismarck Archipelago, Maps: Maps showing results of surveys by Dr. Sapper, Friederici and Others, *n.*, 232; Maps by Dr. K. Sapper, *n.*, 233
 Bithynia: Quer durch Bithynische Halbinsel. Dr. W. Endriss, 155*
 Blackfeet Indians, The Old North Trail, etc. W. McClintock, *n.*, 533
 Blackiston, A. H. Recent Discoveries in Honduras, 475*
 Blackwelder, E. New Light on Geology of Wasatch Mountains, Utah, 635*; ¶ — and H. H. Barrows. Elements of Geology, *rev.*, 939; see also H. S. Gale, *joint author.*
 Blair, W. R. Free Air Data, Mt. Weather, April, May, June, 1910, 394*
 Blanchard, C. J. Lecture on Arid Regions of the U. S. and Reclamation Service, 51
 Blanchard, R. Limite septentrionale de l'olivier dans les Alpes françaises, 558*; Le village de Saint-Véran, 315*
 Bland, J. O. P. and E. Backhouse. China under the Empress Dowager, *rev.*, 460
 Blatchley, R. S. Illinois Oil Fields in 1910, 394*, 635*; Oil Investigations in Illinois, 788*; Oil Resources of —, 474*
 Blázquez, A. Descripción de las costas y puertos de España de Pedro Teixeira Albernás, 227*
 Blonck, W. A. Recent European Progress in Dirigible Balloons, 318*
 Blondel, G. Développement de la Hongrie, 792*; Paris port de mer, 952*; La situation économique de l'Allemagne, 226*
 Bodeli et Borkou (Mission Tilho), Map, *n.*, 231
 Boers: Die Wurzeln der Kapholländischen Volksüberlieferungen. F. T. Schonken, 72*
 Bohemia and the Čechs. History, People, etc. W. S. Monroe, *n.*, 144
 ¶ Maps of Bohemia; Geol. Map of Vostry Fault Region, 473*; Königreich Böhmen und Erzherz. Böhmen-Eger. H. Hanau, 233*
 Böhmerwald: ¶ Morphologie des Böhmerwaldes. Dr. H. Mayr, *rev.*, 46; 397* ¶ Maps of Böhmerwald: Karte der Niederschlagshöhen im, 234*; Kartenskizze der Temperaturverhältnisse im, 234*; Übersichtskarte des Bayerisch-Böhmischen Waldgebirges, 234*
 Bohol, Western, Chart U. S. Coast and Geod. Surv., 158*
 Bokhara: Gebirgspässe des Chanats Buchara. Nach russischen Quellen übersetzt von Oberleut. O. Muszynski, 556*, 951*
 Boland, J. P. Commerce de l'Irlande avec les pays étrangers, 478*
 Bolivia: ¶ Arbitraje entre . . . Bolivia y el Perú y su última negociacion sobre fronteras, *n.*, 302; Cuestión de Límites entre el Paraguay y Bolivia. A. Audibert, 720*; Economic Conditions of. I. Calderon, 395*; Explorations in. Dr. T. Herzog, 525; Exploration ethnograph. et archéol. en — 1908-9. E. Nordenskiöld, 475*; Further Explorations in: River Heath. Maj. P. H. Fawcett, 555*; Geography of Natural Resources, 395*; Mineral Resources and Industry, 950*; Minería

- de estaño en. W. Gray and A. L. Halden, 950*; Note on Map of S. Peru and N. Bolivia. E. A. Reeves, 395*; Remarks on Arbitral Sentence . . . Boundary Question between Bolivia and Peru. P. Fiore, 800*; Siriono-Indianer in Ostbolivien. E. v. Nordenskiöld, 395* ¶ Map of Bolivia: River Heath and Adjacent Territory. Maj. P. H. Fawcett, 391* .
- Böllert, P. Volksdichte in der Oberen Gangesebene (Map), 472*
- Bologna, Map of, *n.*, 311
- Bolster, R. H., *joint author*, see C. C. Covert; R. Follansbee; and N. C. Grover.
- Bonaparte, Charles Lucien. Geographical and Comparative List of the Birds of Europe and North America, 320*
- Bongrain, M. Carte provisoire de l'Antarctique sud-américaine, facing p. 81
- Bonin, C. E. Le Bhoutan et son Développement historique, 556*
- Bonney, Prof. T. G. Some Aspects of Glacial History of Western Europe, 70*
- Bonomi, Joseph, et al. Egypt, Nubia and Ethiopia, 319*
- Book Reviews and Notices, 61, 139, 205, 295, 373, 455, 531, 625, 693, 781, 863, 923
- Borchgrave, Baron de. Quelques mots sur la science américaniste au début du XX^e siècle, 474*
- Boring, The Deepest, 622
- Borneo: Some Contributions to the Physiography and Hydrography of North-East. I. A. Stigand, 224* ¶ Maps of Borneo: Geol. Overzichts-kaart van de landen om de Balikpapan-Baai, 877*; Part of North East Borneo, 160*
- Bornholm, Über die Morphologie von. Dr. G. Braun, 226* (Borrmann, R.) Die Funde von Olympia, 237*
- Böse, E., and F. Toula. Zur jungtertiären Fauna von Tehuantepec, 314*
- Bosnia. See also Herzegovina: ¶ Unterirdisch entwässerte Gebiete in Innerbosnien. Dr. M. Hoffer, 638*; Wanderung durch das östliche Bosnien, Montenegro und Albanien. L. Edlinger, 477*; Bosnia-Erzegovina sotto l'aspetto storico, giuridico et economico. G. Giacchi, 157*
- Boston: ¶ List of Maps of — Published Subsequent to 1600, 222*; Survey of Boston and Vicinity . . . with Topographical Sketches of the County. J. G. Hales, 560* ¶ Charts: Boston Harbor, — Inner Harbor, U. S. Coast and Geod. Surv., 157*
- Botty, P. A. Aux Ortos. Pays et mission, *n.*, 64
- Bougainville, Eine Durchquerung durch. K. Sapper, 226* ¶ Map of: Aufnahmen auf Bougainville, 1908. Dr. K. Sapper, *n.*, 233
- Boule, M. La Haute-Loire et le Haut Vivarais, *n.*, 947
- Boulenger, G. A. Catalogue of Fresh-Water Fishes of Africa in the British Museum, Vol. I, 314*, Vol. II, 800*
- Boulogne: Statistiques. Année 1909, Chambre de Commerce, 71*
- Boundaries: ¶ Boundary between Liberia and Ivory Coast, 855; Frontera Argentina Brasileña, 868*; Zur Geographie der politischen Grenzen. Dr. H. Walser, 318*; German-Dutch Boundary Expedition in New Guinea, 369; Limites actuelles du Brésil par suite des derniers arbitrages et traités. M. de Oliveira Lima, 868*; Remarks on Arbitral Sentence . . . Boundary Question between Bolivia and Peru. P. Fiore, 800*; Togo-Dahomey-Grenzvermessungs-Expedition. A. v. Seefried, 870* ¶ Maps of Boundaries: Demarcación de Límites con Chile. Region de la Puna. Z. Sánchez and T. Loos, 955*; Frontière Franco-Libérienne, 956*; Neue Grenze zwischen Belgisch-Kongo u. Deutsch Ost-Afrika, 547*; Portugiesische Grenzgebiet gegen Deutsch-Südwestafrika zum Verfolg der militärischen operation im Distrikt Huilla, 547*; Projet de délimitation (between French Guinea and Liberia), 955*; Sahara Oriental. (Shows Franco-Tripolitan Boundary), 955*
- Bourée, H. Carte générale bathymétrique des Océans, 73*
- Bourge, Comm. G. Le port de Rio-de-Janeiro et ses travaux d'amélioration, 868*
- Bourrit, M. T. Description des Aspects du Mont Blanc . . . Présenté à sa Majesté le Roi de Sardaigne, 320*; Nouvelle Description des Vallées de Glace . . . des Alpes, etc., 237*; Nouvelle Description des Glacières . . . qui forment la Grande Chaîne des Alpes de Savoye, de Suisse et d'Italie, 238*
- Bourrit, T. Relation of a Journey to the Glaciers in the Dutchy of Savoy. Transl. by C. and F. Davy, 238*
- Bovell, J. R. Agricultural Labour Conditions of Barbados, 475*

- Bowie, W. Great Arc of Triangulation (Texas-Cal.), 447
- Bowman, I. The Amazon, 555*; Expedition in Peru, 685
- Bownocker, J. A. Mineral Resources of Ohio, 714*
- Bow River Valley, Alberta, Pre-Cambrian Rocks of. C. D. Walcott, 222*
- ☐ Map of: Bow River Valley — between Bow Peak and Castle Mountain Station, 77*
- Braam Houckgeest, André Everard van. Voyage de l'Ambassade de la Compagnie des Indes Orientales Hollandaises . . . 1794 & 1795, etc., 237*
- Brady, Hon. J. G., Lecture on Alaska, 365
- Brahmaputra: Source principales du Brahmapoutre et du Sutledje. A. H. Savage Landor, 225*
- Brand, The Hon. R. H. Union of South Africa, *rev.*, 205
- Brandstetter, R., Gemeinindonesisch und Urindonesisch, 720*
- Branner, J. C. Geology and Topography of Serra de Jacobina, Bahia, 476*; Geological Work of Ants in Tropical America, 293, 394*; Minerals associated with Diamonds and Carbonados in Bahia, 715*; Map to illustrate paper on N. E. Bahia, 796*; Sketch Map of Approximate Limestone Areas of the Interior of Bahia, 796*; — to explore western part of the north coast of Brazil, 197
- Bransford, J. F. Archæological Researches in Nicaragua, 720*
- Braun, Dr. G. Über die Morphologie von Bornholm, 226*; Über Bodenbewegungen, 317*
- Brazil: ☐ Almanaque Brasileiro Garnier para o anno de 1909, 223*; Anuario publicado pelo Observatorio do Rio de Janeiro para os Annos de 1909-1910, 67*; With an automobile off the Brazilian Highway, 950*; *Boletim* mensal do Observatorio do Rio de Janeiro, Abril-Dez., 1908, 152*; Dr. Branner to explore western part of north coast of, 197; Le Brésil au XX^e siècle. P. Denis, *rev.*, 626; English transl., *rev.*, 924; Brasile. Lo Stato di Goyaz. E. Axerio, 715*; Brazil and Her People of To-day. N. O. Winter, *rev.*, 63; Au Brésil. Du Rio São Francisco à l'Amazone. P. Walle, *n.*, 534; Contribuições recentes para a cartographia do. O. A. Derby, 152*; Développement des chemins de fer au Brésil, 395*; Frontera Argentino Brasileña, 868*; Iron Ores of, 555*; Itinerario da Expedição Espinhosa em 1553, 153*; Limites actuelles du Brésil par suite des derniers arbitrages et traités. M. de Oliveira Lima, 868*; Madeira-Mamoré R. R. P. H. Ashmead, 636*; Navegação na costa do Rio Grande do Sul. A. Alves Dos Santos, 715*; Revista do Museu Paulista. H. v. Ihering, 960*; Rietsuiker-industrie van productie. Brazilie. H. C. Prinsen Geerligs, 222*; Territoire fédéral l'Acre et la ligne du Madeira au Mamoré. P. Walle, 636*; Through Wildernesses of. W. A. Cook, *rev.*, 302 ☐ Maps of Brazil: Brazil segundo os mais recentes Trabalhos. R. Hausermann, 876*; Forschungsreise des Dr. Hamilton Rice im Flussgebiet des Rio Caiary-Uaupés, 707*; Portion of Brazil showing relative position of Diamond Fields, 955*; Republica dos Estados Unidos do Brazil, 634*
- Breckenridge District, Col., Maps, 954*
- Brehm, Dr. V. Einfluss glazialer und postglazialer Verhältnisse auf die niedere Tierwelt Mitteleuropas, speziell auf deren geog. Verbreitung, 718*
- Breitung, Dr. E. Wollschafzucht in Deutsch-Südwestafrika, 556*
- Bremen: Jahrbuch für Statistik, 1910, 478*
- Brenier, H., *joint author*, see H. Rus-sier.
- Brennecke, Dr. W. Forschungsreise S. M. S. Planet; 1906-7: Reisebeschreibung, Aerologie und Ozeanographie, *n.*, 212; Ozeanographische Arbeiten der Deutschen Antarktischen Expedition, 952*; Tiefsee-Forschungen der "Planet"-Expedition, 1906-07, 72*; Weitere Mitteilungen über die geplante Deutsche Antarktische Expedition, 227*
- Brennerbuch. Naturansichten und Lebensbilder aus Tirol. H. Noë, 238*
- Brent, C. H. Progress and Problems in the Philippines, 477*
- Breslau, Die Geologischen Verhältnisse der Umgebung von. O. Tietze, 558*
- Breton [de la Martinière, J. B.]. China: its Costume, Arts, etc., 236*
- Bretz, J. H. Terminal Moraine of the Puget Sound Glacier, 714*
- Bridges, J. H., *joint author*, see R. W. Richards.
- Bridgman, H. L. History of Field Work of Peary Arctic Club, 872*; The Sudan To-day and To-morrow, 716*

- Brien, V. Gîtes métallifères du Congo Belge, 790*
- Briet, L. Barrancos et Cuevas (Haut-Aragon-Espagne), 719*
- Briggs, L. J., and J. O. Belz. Dry Farming in Relation to Rainfall and Evaporation, 523
- Brigham, A. P. Commercial Geography, *rev.*, 940; Distribution of Population in the United States, 947*
- Brigham, W. T. Volcanoes of Kilauea and Mauna Loa, etc., *n.*, 141
- Bright, C. Imperial Telegraphic Communication, *n.*, 947
- Brindle, E. With Russian, Japanese and Chunchuse. Experiences of an Englishman during the Russo-Japanese War, 320*
- Briquet, A. Sur la morphologie de la partie médiane et orientale du Massif Central, 718*
- Britain: See under Great Britain.
- British Columbia: ¶ Across the Purcell Range of —. Dr. T. G. Longstaff, 868*; Beaverdel District, West Fork of Kettle R. L. Reinecke, 949*; Fruit Ranching in. J. T. Bealby, *rev.*, 298; Geology of Victoria and Saanich Quadrangles. C. H. Clapp, 948*; Ice River District. J. A. Allan, 948*; Parts of Similkameen and Tulameen Districts. C. Camsell, 948*; Portions of Atlin District. D. D. Cairnes, 948*; Portland Canal District. R. G. McConnell, 949*; Reconnaissance in East Kootenay. S. J. Schofield, 949*; Skeena R. District. W. W. Leach, 949*; Slokan District. O. E. Leroy, 949* ¶ Maps of British Columbia: Index to Townships in British Columbia, etc., 230*, *n.*, 390; Map of Boundary between — and Yukon Territory from Tatschenshini R. to Teslin Lake, *n.*, 231; Map of Vancouver Island, *n.*, 955; Outline Sketch of Northern Part of Purcell Range, 633*; Part of Selkirk Range Adjacent to Mount Sir Sandford. H. Palmer, 310*; Sketch Map of Part of Railway Belt, *n.*, 230; Sketch Map showing mineral locations of Atlin Mining District, 796*; Sketch map of Portland Canal Mining District, 796*; South-Western Part of, *n.*, 158
- British Empire: Cables and the Empire. R. MacMillan, 316*; State-Owned Trans-Atlantic Cable, 60; Imperial Telegraphic Communication. C. Bright, *n.*, 947; Cotton Growing in the, 620; Cotton Growing within the. J. H. Reed, 792*; Enseignement aux indigènes, *n.*, 149; Geographical Aspects of the Problem of Cotton Growing in. J. H. Reed, 399*; Oil Fields of the Empire, etc. J. D. Henry, *rev.*, 148
- British Guiana. See under Guiana.
- British Isles. See under United Kingdom.
- British New Guinea. See Papua.
- Brittany: Alte Sitten in der Bretagne. Dr. H. Schoen, 315*
- Brockedon, W. Journals of Excursions in the Alps, 238*
- Brooks, A. H. Alaska Coal and its Utilization, 474*; Mining Industry in 1909, 553* ¶ —, and L. M. Prindle. Geological Reconnaissance Map of Mount McKinley region, 795*
- Brooks, B. T. Natural Dyes and Coloring Matters of the Philippines, 718*
- Broomhall, M. Islam of China. A Neglected Problem, *rev.*, 782
- Brounow, Prof. P. Abhängigkeit einiger geographischen Elemente von dem barischen Relief der Erdoberfläche, 73*
- Brown, C. M. Coconuts in the Americas, 313*
- Brown, G. Melanesians and Polynesians. G. Brown, *rev.*, 463
- Brown, R. M. Geography of Worcester, Mass., 366; Review of Waterway Problem, 573; World's Great Rivers. The Mississippi, 474*
- Brown, R. N. R. British Work in Spitsbergen: Some Historical Notes, 639*
- Brown, W. R. Forestry Progress in New Hampshire, 474*
- Bruce, Col. Sir David, and Others. Further Researches on the Development of *Trypanosoma gambiense* in *Glossina palpalis*, 794*
- Bruce, W. S. Polar Exploration, *rev.*, 785; Scottish Exploration in Prince Charles Foreland 1906-7, 872*
- Bruck, Dr. W. F. Studien über den Hanfbau in Italien, 719*, 793*
- Brückner, Dr. Ed. Bericht der internat. Gletscherkommission für 1907-10, 794*; Italienisch-österreichische Projekt einer gemeinsamen Erforschung des Adriatischen Meeres, 73*; Variations périodiques des glaciers. Alpes orientales, 477*; Vorläufiger Bericht über die erste Kreuzungsfahrt *Najade* in der Hochsee der Adria, 718*
- Bruhns, Dr. B. Geographische Forschungsreisen und ihre Ziele, *rev.*, 215
- Brunhes, J. Géographie humaine. Essai de Classification, *rev.*, 467;

- Méthode de l'échantillonnage topographique au service de morphologie, 74* ¶ Jean — e l'opera sua. A. Micheli, 639*
- Brünn, Map: G. Freytag's Automobil- und Radfahrer-Karte, 79*
- Brunnthal, J. Viktoriafälle des Sambesi und ihre Umgebung, 717*
- Bryant, H. G. Notes on Early American Arctic Expedition, 872*
- Buccaneers in the West Indies in the XVIIth Century. C. H. Haring, *rev.*, 457
- Buckwald, O. von. Zur Völkerkunde Südamerikas, 475*
- Buenos Aires, Bulletin of Municipal Statistics, 395*
- Bührer, Lieut. Carte du Pays Mahafaly, 391*
- Buka. Nach Aufnahmen von G. Friederici u. Bergingenieur Schön sowie eigenen Beobachtungen von Prof. Dr. K. Sapper, 226* ¶ Maps of: Buka. Dr. K. Sapper, *n.*, 233; Geologische Kartenskizze von. Dr. K. Sapper, *n.*, 233
- Bulgaria: ¶ Durch das Strumadefilee nach der bulgarischen Thermenstadt Küstendil. F. Meinhard, 315*; Griechen und Bulgaren im neunzehnten und zwanzigsten Jahrhundert. Prof. N. Kasasis, *n.*, 144; Population of (1910), 689; Preliminary results of the Census, 1910, 638*; Statistics of Commerce of Bulgaria with foreign countries, 1909, 558* Map of Bulgaria: Situationsplan der Eisenbahnstrecke Radomir-Küstendil, 79*
- Bumpus, T. F. Cathedrals of Northern France, *n.*, 702
- Bunker, A. Sketches from Karen Hills, *n.*, 65
- Burchard, E. F. Production of Iron Ore, Pig Iron and Steel in U. S. in 1909, 284; —, A. H. Purdue and Others. Structural Materials. Metals and Nonmetals, Except Fuels, 221*
- Burckhardt, Dr. C. Estudio Geológico de la Region de San Pedro del Gallo, 222*
- Bureau of Insular Affairs, Report for 1910, 867*
- Burma: ¶ The Burman, His Life and Notions. S. Yoe, *rev.*, 305; Geology and Prospects of Oil in Western Prome and Kama. M. Stuart, 556*; Sketches from the Karen Hills. A. Bunker, *n.*, 65
- Burmester, Dr. H. Einige Beobachtungen über tropische Schutzkrusten und Wadibildungen, 73*
- Burnett, F. Through Tropic Seas, *n.*, 380
- Burpee, L. J. Canoe Routes from Lake Superior Westward, 394*
- Burroughs, J., J. Muir and G. B. Grinnell. Alaska Narrative, Glaciers, Natives. (Harriman Alaska Series), 480*
- Burton, J. H. Cairngorm Mountains, 238*
- Bushman: Die Auin. Beitrag zur Buschmannforschung. H. Kaufmann, 154*; Buschleute der Namib, ihre Rechts- und Familienverhältnisse. Oberleut. Trenk, 154*
- Businger [J.] Itinéraire du Mont-Righi et du Lac des 4 Cantons . . . description de Lucerne, etc., 238*
- Buss, E., and A. Heim. Bergsturz von Elm den 11 Sept., 1881, 238*
- Busson, H., J. Fèvre et H. Hauser. La France et ses Colonies, *n.*, 148
- Büttikofer, J., Notizie sulla Repubblica di Liberia. Specialmente Secondo i Viaggi e gli Studi di —. Prof. G. Cora, 637*
- Butts, C. Southern Part of Cahaba Coal Field, Ala., 867*; Maps and Sections, 629; — M. R. Campbell and Others. Coal and Lignite, 553*; see also J. S. Diller, *joint author.*
- Buzzards Bay, Vineyard Sound and —, Chart U. S. Coast and Geod. Surv., 158*

C.

- Cacahuamilpa, Escursion a la Caverna de — y Ascension al Crater del Popocatepetl. E. Landensio, 236*
- Cacao, Production et consommation du. P. Clerget, 479*
- Cacqueray, Marquis de. Chez les Indigènes de la Nouvelle-Guinée Britannique, 225*
- Caiahy-Uaupés, Forschungsreise der Dr. H. Rice im Flussgebiet des Rio —. Dr. T. Koch-Grünberg, 950*; Map, 707
- Caicara, Geologic and Petrographic Notes on the Region about —. T. A. Bendrat, 715*; 790*
- Caillie, R., Le Tafilelt. D'après —, 716*
- Cairnes, D. D. Preliminary Memoir on Lewes and Nordenskiöld Rivers, Coal District, 475*; Portions of Atlin District, 948*
- Cairngorm Mountains. J. H. Burton, 238*
- Caix, R. de. Aspect présent de la question de Bagdad, 637*; Derniers développements de l'Affaire marocaine,

- 951*; Les Évenements du Ouadaï et la Mort du Colonel Moll, 224*; La question du Tibesti, 717*
- Cajamarca, Departamento de. F. Malaga Santolalla, 790* ¶ Map: Cajamarca. F. Malaga Santolalla and C. Vallejos Z., 547*
- Calabria: ¶ Catastrofe sismica Calabro Messinese (28 Dic., 1908). M. Baratta, *n.*, 145; Danni prodotti dei terremoti nella Basilicata e nelle Calabrie. Prof. G. Mercalli, *n.*, 145; A travers la Calabre. L. et C. de Fouchier, 227*
- Calamotta, Der Kanal von, *n.*, 145
- Calciati, Dr. C. Les Fronts des glaciers de Yengutsa et d'Hispar, 477*; Trois "bouches" de la Sarine (Map), 959*
- Calderon, I. Economic Conditions of Bolivia, 395*
- Caledonia. See Scotland.
- California: ¶ Birds of California in Relation to the Fruit Industry. F. E. L. Beal, 221*; Carrying Water Through a Desert. . . . Los Angeles Aqueduct. B. A. Heinly, 221*; Coal in San Benito Co. M. R. Campbell, 714*; Extension of the Known Area of Pleistocene Glaciation to the Coast Ranges of. R. S. Holway, 161*; Geographic Influences in the Development of. J. F. Chamberlain, 788*; Great Arc of Primary Triangulation. W. Bowie, 447; How to increase the Yield of Wheat in. G. W. Shaw, 714*; Impressions de Californie. Ascension du Tamalpais. E. Deschamps, 553*; Mineral Productions, County Maps and Mining Laws of. L. E. Aubury, 960*; State Mining Bureau, General Index Publications. L. E. Lewis, 960*; Oil and Gas in South Midway Field, Kern Co. W. Forstner, 553*; Prel. Report on Geology and Oil Prospects of Cantua-Panoche Region. R. Anderson, 394*; Serpentine of Central Coast Ranges of. H. E. Kramm, 151*; Three Years in. W. Colton, 236*; Über die Ursachen des Kalifornischen Erdbebens von 1906. A. Rothpletz, 714* ¶ Maps of California: Alkali Map of Woodland Area, 229*; Approximate Location of Principal Mineral Deposits, 876*; Geological Map of Sargent Oil Field, 390*; Map of Twenty-two Spanish and American Trails and Routes Affecting —, 1694-1849, 799*; 19 outline county maps showing railroads and stage lines with distances between points, 795*; Soil Survey Map of Woodland Area, 229* ¶ U. S. G. S. Maps: Administrative Map of Yosemite National Park. R. B. Marshall and A. H. Sylvester, *n.*, 77; Topographic Sheets of: Antelope, Arcade, Brighton, and Hawthorne Quadrangles, 873*; Parker Quad., 629*; Bruceville, Castle, Galt, Headreach, Isleton, Jersey, Knights Landing, Lincoln, Marcuse, New Hope, Nicolaus, Pleasant Grove, Rio Vista, Sheridan, Roseville, Vernon and Woodbridge Quadrangles, 75*; Furnace Creek Quad., 75*; Wheatland Quad., 398*; Topographic Survey of Southern —, 157*; Sketch Map of Trinity R. Basin showing areas of Auriferous Gravels of Second and Third Cycles of Erosion, 874* ¶ Charts U. S. Coast and Geod. Survey: Mare Island Strait, 631*; Pacific Coast from San Diego to Santa Monica; from San Francisco to Point Arena, 875*; San Francisco Entrance, 309*; Southern Part of —, 631*; Santa Rosa Is. to Point Buchon, 631*
- California, Lower: ¶ Land of Drought and Desert. Ten Thousand Miles... through Most Extraordinary Cacti Forest in the World. E. W. Nelson, 868*; Expedition to —, 195; Recherches anthropologiques sur la Basse-Californie. Dr. P. Rivet, 635* ¶ Map of Lower California: Outline Map, 634*
- Calvert, A. F. Nigeria and Its Tin Fields, *rev.*, 928
- Calvin, Prof. Samuel, *Obituary*, 624
- Cambry, J. Voyage pittoresque en Suisse et en Italie, 238*
- Cameron, A. D. From Winnipeg to Arctic Ocean, 715*
- Cameroon: See Kamerun.
- Campbell, J. Información descriptiva sobre la provincia de San Juan, 715*
- Campbell, M. R. Coal in San Benito Co., Cal., 714*; Map of Black Mesa Coal Field, Ariz., 630*; — and H. E. Gregory. Black Mesa Coal Field, Ariz., 867*; — and E. G. Woodruff. Powell Mountain Coal Field, Va., 788*; see also A. H. Butts, *joint author*.
- Campbell, W. D. Geological Map of the Country between Arrino and Northampton, 232*; Irwin, R. Coalfield and adjacent districts (Western Australia), 557*
- Campbell, W. W. Return of Halley's Comet, 479*
- Camsell, C. Parts of Similkameen and Tulameen Districts, B. C., 948*

- Canada, General: ¶ Across Sub-Arctic of. J. W. Tyrrell, 319*; Canada. The Land of Hope. E. W. Elkington, *rev.*, 300; Chez les Français du Canada. J. Lionnet, *rev.*, 61; Un voyage à travers le Canada français. R. Ernst, 949*; Climate and Physical Condition of Keewatin. A. P. Coleman, 394*; Colonisation of Western —, 715*; Constitution of. J. E. C. Munro, 319*; Dates importantes pour l'histoire de la découverte géographique . . . Canada. E. Petitot, 554*; Deux Voyages dans l'Amérique du Nord [Description of Cobalt and Schibogomo Districts]. M. A. de Romeu, 554*; Expedition to Spillimacheen Mountains. Photo-Top. Surveys. A. O. Wheeler, 868*; Exploring the Canadian Northwest, 185; Geologist's Paradise [Mountains]. C. D. Walcott, 868*; Heaton's Annual. Commercial Handbook, etc., *n.*, 544; Hudson Bay R.R., 152*; Population [Census 1911], 917; Progress of the Grand Trunk Pacific R.R., 917; H. I. Smith to Conduct Archaeological Survey of, 861; History of the "Canadian Shield." Prof. A. P. Coleman, 66*; H. V. Radford in Northern Canada, 134, 777; Riders of the Plains. Adventures . . . North-West Mounted Police. A. L. Hayden, *rev.*, 61; Saskatchewan R. District. W. McInnes, 949*; Sport and Travel in the Northland of. D. T. Hanbury, 236* ¶ Decisions Geographic Board of Canada, 66, 394, 554, 635, 715, 949* ¶ Economic: Conservation of Agricultural Resources. Dr. J. W. Robertson, 554*; Conservation or the Protection of Nature. C. G. Hewitt, 789*; Forest, Lake and Prairie. 20 Years of Frontier Life in W. Canada. (John) McDougall, 400*; Fur-Bearing Animals of — and How to Prevent their Extinction. F. T. Congdon, 475*; Immigration into, 286; Industrial Development of. E. T. Powell, 554*; A Railroad's Forest Enterprise, 685 ¶ Government Reports: Annual Report, Topographic Survey Branch, 1908-9, 475; 1909-10, *rev.*, 455; Commission of Conservation, Report First Annual Meeting, 554*; Rep. on Traverse through southern Part of North West Territories from Lac Seul to Cat Lake. A. W. G. Wilson, 554*; Report on Part of N. W. Territories drained by Winisk and Attawapiskat Rivers. W. McInnes, 554*; Summary Rep. Geol. Surv. Branch Dep. of Mines, for 1910, 715* ¶ Minerals and Mining: Clay Resources of Western Provinces. J. Keele, 949*; Clay and Shale Deposits of Western. H. Ries, 949*; Department of Mines of Canada, its Organization and its Work. A. W. G. Wilson, 475*; Descriptive Sketch of Geology and Economic Minerals of. G. A. Young, *rev.*, 455; Mineral Production of — in 1910, 635*; Possible Economies in Production of Minerals of Canada. Dr. E. Haanel, 554* ¶ Maps of Canada: Braeburn-Kynocks and Tantalus Coal Areas, 230*; Cereal Maps of Manitoba, Saskatchewan and Alberta, *n.*, 159; Chart of Magdalen Islands, 796*; Explored Routes on parts of Albany, Severn, and Winisk Rivers, etc., *n.*, 230*; Indexed Pocket Map of Saskatchewan, 796*; Index Map to . . . Maps published by Dep. of Militia and Defence, *n.*, 955; Index to Townships in Manitoba, Saskatchewan, Alberta and British Columbia, 230*; *n.*, 390; Lake Nipigon, Thunder Bay District, 230*; Map of Abitibi Region indicating surveyed Townships traversed by the Transcontinental R.R., etc., 633*; Map of Canada. Geology, 390*; Minerals, 390*; Map showing Glacial Geology of the U. S. and —, *n.*, 954; Map of Western Canada. R. E. Young, *n.*, 77; Mineral Map, 796*; Prince Edward Island, Nova Scotia and New Brunswick. R. E. Young, 78*; Proposed Forest Reserve on Eastern Slope of the Rocky Mts., 230*; Resource Map of —, 1911, 955*; Sketch Map of Dalhousie showing relation of eruptive mass and its apophyses to the Devonian marine sediments; Sketch Map of Devonian fish locality at Migouasha, 796*; Sketch Maps showing topography of Base Lines and Meridians in Alberta and Saskatchewan, 390*; Sketch Plan showing Topography of Eleventh Base Line across Ranges 8 to 19, west of fifth Meridian, *n.*, 230; Sketch Maps showing Mineral locations of Atlin Mining District, B. C., 796; Portland Canal Mining District, 796*; Top. Sketch of Portion of Jasper Park, 796*; Standard Topographical Map, 390*, 546*; Vicinity of the National Transcontinental R.R. Abitibi District, 633* Canary Islands: Les îles Canaries. F. Longrée, 791* Candler, E. Mantle of the East, *n.*, 65 Canning, A. W. Wiluna-Kimberley

- Stock Route by —, 1906-07 (Map), 798*; Expeditions in Western Australia, 952*
- Canon City Coal Field. Col. C. W. Washburne, 152*
- Canzio, E. Alpinisme sans guide, 318*
- Cape Cod Bay, Chart U. S. Coast and Geod. Surv., 76*
- Cape Colony (Province of the Cape of Good Hope): ¶ Annual Report, Geol. Commission, 1909, 716*; Colonia del Capo. P. Pasi, 950* ¶ Map of: Geologic Map of the Province, *n.*, 472; Kärtchen der Eisbewegung zur Wyka-Eiszeit am Oranje und Vaal, 708*
- Capitan, Dr. Le XVI^e Congrès International des Américanistes, 228*
- Capps, S. R. Underground Waters of North-Central Indiana, 714*; see also F. H. Moffit, *joint. author.*
- Capra, Dr. G. Italiani in Australia, 871*; Nuova Zelandia (Una Italia Australe), 718*
- Capus, Dr. G. Spécialisation des Jardins botaniques dans les recherches d'agriculture tropicale, 479*
- Caracas, Ferrocarril de la Guaira a —. J. Flind, 636*
- Card, E. R. de. La France et la Turquie dans le Sahara oriental, 480*
- Caribbean, Colonization of the. F. Cundall, 395*
- Carleton, Prof. M. A. Future Wheat supply of the U. S., 151*
- Carnegie Institution of Washington, Year Book for 1910, 553*
- Carney, F. Abandoned Shore Lines of the Oberlin Quadrangle, 394*; Geographic Influences in Development of Ohio, 867*; Raised Beaches of Berea, Cleveland and Euclid Sheets, Ohio, 394*
- Carnier, C. Reisen in Matto Grosso und Paraguay, 869*
- Caroline Islands. Recent Bibliography, 510*; Peopling of Yap. W. Churchill, 510
- Caron, l'abbé Iv. Colonisation du Témiscamingue, 152*
- Carpathian Mountains: Sur la position systématique de la chaîne des Karpates. E. de Martonne, 71*
- Carruthers, D. Explorations in N. W. Mongolia, 396*
- Carthage and Tunis, old and new gates of the Orient. D. Sladen, 319*
- Carthaus, Dr. E. Insel Timor, 396*
- Cartography. See also Maps: ¶ Aviation Cartography, 779; August Petermann: Ein Beitrag zur Geschichte der geographischen Entdeckungen und der Kartographie im 19. Jahrhundert. Dr. E. Weller, *rev.*, 845; Bergzeichnung auf den älteren Karten. J. Röger, 480*; Aus der Geschichte der Kartographie. W. Wolkenhauer, 399*; Contribuições recentes para a cartographia do Brazil. O. A. Derby, 152*; Fortschritte der deutschen Kolonial-Kartographie in den Jahren 1905-10. P. Sprigade and Moisel, 316*; Gegen-azimutale winkeltreue Projektion. Dr. H. Mauer, *n.*, 552; Isogonenkarte in besonderer Projektion. Dr. H. Maurer, 799*; Kartenprojektion. Ein geogr.-kartogr. Kapitel aus . . . Kartenwissenschaft. M. Eckert, 317*; Kartographie in der Türkei. A. D. v. Diest, 227*; Maps of Primitive Peoples. B. F. Adler, 316*; Résumé in English, 669; Kuhnert physikalische Erdkarte in Mercators Projektion mit Darstellung der Meeresströmungen. Dr. G. Leipoldt, *n.*, 235*; Kunst in der Kartographie. Prof. F. Becker, 73*; 399*; Neue Anforderungen an das Landesvermessungswesen und an Topographie und Kartographie. F. Becker, 399*; Réfection en Fac-similé des anciens monuments de Géographie . . . son utilité pour la création de Musées cartographiques. C. Perron, 73*; Schweizer Schul-Kartographie. Dr. R. Hotz-Linder, 871*; Tables for Projection of Graticules for Maps on the scale of 1:1,000,000, *n.*, 220; De l'utilité d'une association cartographique internationale. Gen. J. de Schokalsky, 73*
- Casablanca, 155*; Monographie de la Chaouïa. Lieut. Sagonds, 476*; Journal du corps de débarquement de — à travers la Chaouïa (1907-8). Capt. Grasset, 869* ¶ Map of Casablanca; Region de, *n.*, 391
- Casey, T. L. Subsidence of Atlantic Shoreline, 953*
- Casson, H. N. History of the Telephone, *n.*, 308
- Casson, J. C. Agricultural Labour Conditions . . . Nyasaland, 556*
- Castagné, M. J. Question kirghize et la Colonisation des Steppes, 477*
- Castro, L. de. Criminali, Giudici e tribunali etiopici, 636*
- Catalogues. See also Bibliographies: American Catalog [ue], 1908-10, 800*; Catálogo de los Manuscritos a los Antiguos Jesuitas de Chile, 640*; Catálogo del Archivo de la Real Audencia de Santiago, 720; Catalogue of Fresh-Water Fishes of Africa

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- Catalonia: Groupement des populations dans la Catalogne septentrionale. M. Sorre, 639*
- Catellani, E. Ferrovie della Manicuria e l'Accordo Russo-Giapponese, 224*
- Cator, D. Map of Part of Nassarawa Province, N. Nigeria, 155*, Map, 78*
- Caucasus: Zur Lage der Schneegrenze im Kaukasus. A. v. Reinhard, 871*; Cave Dwellers of the Old and New Worlds. J. W. Fewkes, 399*
- Caves: Barrancos et Cuevas. (Haut-Aragon). L. Briet, 719*; Caves and Ruins of Arizona and Colorado. C. Hallock, 394*
- Cebu Harbor, Chart U. S. Coast and Geod. Surv., 158*
- Celebes: ¶ Bevatende eenige gegevens betreffende het landschap Mamoejdjoë, 870*; Celebes en Halmahera. E. C. Abendanon, 224*; Expedition der Kgl. Niederländ. Geogr. Gesellschaft nach Zentralcelebes 1909-10. E. C. Abendanon, 792* ¶ Maps of Celebes: Reisen door Centraal-Celebes. E. C. Abendanon and W. Schiebel, 549*; Zentral-Celebes. Reisen der Exp. der kgl. Nederlând. Geog. Gesell. E. C. Abendanon, 549*
- Central America. See under America.
- Central Asia. See under Asia.
- Cereals: Getreidebau im deutschen und römischen Altertum. R. Gradmann, *n.*, 148
- Ceylon. A. Clark, *n.*, 305; —, Malay States and Java Compared as Plantation and Residential Colonies. J. Ferguson, 638*; The Veddass. C. G. and B. Z. Seligmann, *rev.*, 930 ¶ Maps of: Map of Ceylon, 877*; Map illustrating The Veddass, 956*
- Chad Lake: ¶ French Mission to. Capt. J. Tilho, 223* ¶ Maps of Chad Lake: Lac Tchad (Mission Tilho), *n.*, 231; Sketch of route across. P. A. Talbot, 877*; Tschadsee in Gegenwart und Vergangenheit. A. Bencke, 877*
- Chad Lake Region: ¶ Documents scientifiques de la Mission Tilho (1906-09), *n.*, 303; O. MacLeod and P. A. Talbot Explorations in, 526; Mise en valeur du Territoire du Tchad. Lieut.-Col. H. Mill, 223* Chailley, J. L'Inde Britannique, *rev.*, 207
- Chalmers, G. Caledonia; or, A Historical and Topographical Account of North Britain, . . . Dictionary of Places, 320*
- Chamberlain, A. Present Forest Problems of. Massachusetts, 948*
- Chamberlain, J. F. Climate as related to Industry and Commerce, 317*; Geographic Influences in the Development of California, 788* — and A. H. Chamberlain. North America. A Supplementary Geography, *n.*, 939
- Chamberlin, R. V. Ethno-Botany of the Gosiute Indians, 788*, 867*
- Chamberlin, T. C. and R. T. Certain Phases of Glacial Erosion, 720*
- Chambers, G. F. Halley's Comet, 318*
- Chambers, Capt. I. W. Aviation and Aeroplanes, 635*
- Chamonix, Itinéraire de la Vallée de —, d'une Partie du Bas-Vaillais et des Montagnes avoisinantes. [J. P. Berthout van Berchem], 320*
- Champlin, J. D. The Discoverer of the Philippines, 587
- Chandler, C. L. Argentine Meteorological Station in South Orkney Islands, 152*
- Chauouia. Journal du corps de débarquement de Casablanca à travers la — 1907-8. Capt. Grasset, 869*; Monographie de la. Lieut. Sagonds, 476*
- Chapman, R. H. Triangulation and Spirit Levelling of Vancouver Island, 554*; United States Geological Survey, 553*
- Charcot, Dr. J. B. Expédition antarctique française 1908-10, 559*; The Second French Antarctic Expedition, 639*; Le Pourquoi Pas? dans l'Antarctique (1908-10), 719*; The Voyage of the "Why Not" in the Antarctic. English version by P. Walsh, *rev.*, 865; Charcot's Antarctic Explorations. E. S. Balch, 81; Exploring Ship presented to Dep. of Pub. Instruction, 60; Personal, 372
- Charente, Les origines de la vallée de la —. Ch. Passerat, 871* ¶ Maps of the Charente: Les différentes cycles d'érosion dans la région de la —; Carte tectonique de la région, *n.*, 710
- Charleston Harbor. Chart U. S. Coast and Geod. Surv., 157*
- Charlotte Harbor, Florida, Main Entrance to —, Chart U. S. Coast and Geod. Survey, 545*

- Charpentier, J. de. Essai sur les Glaciers et sur le terrain erratique du bassin du Rhône, 238*
- Charriaux, H. La Belgique moderne, *n.*, 933
- Charts: ¶ Atlas of Portolan Charts. Edited by Dr. E. L. Stevenson, 530; Charts of the Chief Hydrographic Office, Russia, 798, 799; Charts showing Position and kind of Lights on the Coast and Rivers of China, 549*; General Catalogue of Mariners' Charts and Books, 314*; Portolani italiani del Medioevo. Secondo l'opera di K. Kretschmer. C. Errera, 953*; Skeleton of Plotting Charts. Lieut. R. Stone, 635* ¶ U. S. Hydrographic Office Charts, 76, 158, 229, 309, 389, 470, 545, 632* ¶ U. S. Coast and Geod. Survey Charts, 76, 157, 309, 470, 545, 631, 875* ¶ U. S. Weather Bureau Charts, 158, 229, 309, 389, 546, 632, 706, 795*
- Chase, J. S. Yosemite Trails, 923
- Châtelet, La Scava; or, Some Account of an Excavation of a Roman Town on the Hill of —, etc. [Stephen Weston], 239*
- Chattanooga Campaign, With especial reference to Wisconsin's participation therein. M. H. Fitch, 880*
- Chauvenet, R. Tin Deposits of El Paso Co., Texas, 553*
- Chauvigné, A. Topographie gallo-romaine de la Touraine, 718*
- Checchi, M. Asmara, 223*
- Chekian: Northeastern Chekian, China: Notes on Human Adaptation to Environment. T. Goodchild, 801
- Cheltenham, Md. Results of Magn. Observations made at the Coast and Geod. Surv. Observ. at —, 1907-8. D. L. Hazard, 635*
- Chengtu: Cité chinoise de Tchentou, ville principale du Se-Tchouan. H. Asselin, 792*
- Chesapeake Bay Entrance, Chart U. S. Coast and Geod. Surv., 157*
- Chevalier, A. Navigation on Upper Niger, 288; La Mission —. [French West Africa], 154*; see also J. Thoulet, *joint author*.
- Cheyenne, Great Mysteries of the. G. B. Grinnell, 553*
- Chichen-Itza, Trip to, 868*
- Chile: ¶ Anuario de la Prensa Chilena. Public. por la Biblioteca Nat. 1899, 640*; Bituminous Coal of, 636*; Catálogo del Archivo de la Real Audiencia de Santiago, 720*; Catálogo de los Manuscritos a los Antiguos Jesuitas de, 640*; Chile of To-day. Its Commerce, its Production and Its Resources. A. Ortúzar, 319*; Von der chilenischen Längsbahn. Dr. H. Polakowsky, 153*; Nitrate Resources of, 197; Il primo congresso degli Italiani nel Cile. E. Vellani, 790* ¶ Maps of Chile: Demarcación de Límites con Chile. Region de la Puna. Z. Sánchez and T. Loos, 955*; Mapa de Chile, 391*; Region Salitrera de — comprendida entre El Toco i Copiapó. J. J. Heuissler, *n.*, 797; Relief Model showing Effects of Valparaiso Earthquake. G. C. Curtis, 525; Republica de Chile. L. Riso Patron, *n.*, 159; Trabajos jeodésicos chilenos, *n.*, 78
- China: ¶ Descriptive: Among the Sons of Han. Notes . . . Residence . . . China and Formosa. Mrs. T. F. Hughes, 237*; China: Its Costume, Arts, Manufactures, etc. Breton [de la Martinière, J.-B.], 236*; China under the Empress Dowager. Being the History of Life and Times of Tzu Hsi. J. O. P. Bland and D. Backhouse, *rev.*, 460; En Chine. G. Donnet, 400*; Cook's Handbook for Tourists to Peking, Tientsin, Shan-Hai-Kwan, Mukden, Dalny, Port Arthur and Seoul, *n.*, 376; Explorations dans la Chine occidentale. A. Legendre, 717*; Über de geologische Entwicklung Chinas. Prof. F. Frech, 156*; Journal of Three Voyages along the Coast of. C. Gutzlaff, 237*; Kientchang et Lolotie. Chinois-Lolos-Sifans. Dr. A. F. Legendre, *n.*, 376, 717*; Land of the Great Wall. Lecture by W. E. Geil, 132; Provinces of China, *rev.*, 782; Dans les rapides du Yalong. Mgr. de Guébriant, 70*; Sketches of Chinese Customs & Manners in 1811-12, etc. G. Wilkinson, 237*; Travels . . . with a Narrative of Residence in China. P. Dobel, 236*; Vandalism in China. F. McCormick, 56; Wanderings in. C. F. G. Cumming, 236* ¶ La Femme chinoise, 156*; Letters from . . . Particular Reference . . . Women of China. S. P. Conger, *rev.*, 698 ¶ Chemins de fer chinois. E. de Laboulaye, 637*; Emprunt pour les chemins de fer Hankéou-Canton et Hankéou-Seu-Tchouan, 951* ¶ Economic and Commercial: Abstract of Statistics. Returns of Trade and Trade Reports, 1909, 70*; S. Coast Ports, 1910, 396*; Analysis of foreign trade 1909, Imports, 477*; Foreign Trade of — 1910, 951* Frontier Ports. Returns of Trade, 1909, 396*;

- China and Its Resources, Peculiarities, etc. . Opium Question and Notice of Assam. R. Mudie, 237*; Das chinesische Fischerwesen. L. Katscher, 156*; Famine in, 137; Question de l'opium. Un nouvel accord anglo-chinois, 951*; Réforme monétaire en Chine, 156*; Report on the Working of the Imperial Post Office, 1909, 156*; Tecaufuhr, 224* ¶ Islam in. A Neglected Problem. M. Broomhall, *rev.*, 782; Religion und Kultur der Chinesen. W. Grube, *rev.*, 931; Valore morale del popolo cinese. Prof. G. Vacca, 717* ¶ Monumenti Sinici, quod Anno Domini MDCXXV terris in ipsâ Chinâ erutum; etc. Andreas Müllerus, 237* ¶ Russie et la Chine, 637* ¶ Maps of China: Distribution of Iron Ores in, 877*; Chinese portion of railroad from Hanoi to Yunnan Fu, 550*; Hoebel's Karte v. China, *n.*, 232; Itinéraire du Capitaine Harfeld dans le Hou Nann et le Kiang Si, 708*; Map — prepared for China Inland Mission, 550; Portions of Chinese Turkestan and Kansu, Kun-lun Range, etc., *n.*, 392; Sketch Map of — and Manchuria to illustrate R.R. in North China and trade routes converging upon Tientsin, 877*; Nine Charts showing Position and Kind of Lights on the Coast and Rivers of, *n.*, 549; Postal Map of, 160; Sketch Plan of Coast Line with Canton and West River deltas, etc., 160*; Sketch Map showing position of Lake Shanghai, 709*; W. Yenchi District, 877* Chinese Turkestan. See under Turkestan.
- Chippewa Music. F. Densmore, 474*
- Chiriqui, Cattle Raising in —. F. Lindsay, 636*
- Chitina District, Alaska, Mining in. F. H. Moffit, 394*
- Choctawhatchee R. Drainage Basin, 475*
- Chodat, Dr. R. and Dr. E. Hassler. Aperçu de la géographie botanique du Paraguay, 67*
- Choffat, P. Présentation d'une carte hypsométrique du Portugal, 71*
- Cholnoky, Dr. J. de. Irrigation dans l'Asie centrale et la migration des peuples, 870*
- Choquequirau, Ruins of —. H. Bingham, 476*, 720*
- Christian, F. W. Eastern Pacific Lands: Tahiti and the Marquesas Islands, *rev.*, 380
- Christiansen, K. Ch. Künstliche Bewässerung Babylonien, 155*
- Chronicles. Historische Kronyck, Grootlycks Vermeerderd en Verbeeterd. Te Leyden MDCCII. J. L. Gottfried, 720*
- Chumash and Costanoan Languages. A. L. Kroeber, 221*
- Churchill, W. Peopling of Yap, 510; Polynesian Wanderings, *rev.*, 265
- Cincinnati, Geographic Influences affecting Early —. N. M. Fenneman, 714*
- Cirque du Creux Noir (Vanoise), Dessin-modèle du rocher en haute montagne, *n.*, 960
- Cities: ¶ Über Aufgaben der Städtekunde. Dr. H. Hassinger, 316*; Fribourg et son site géographique. Étude de géographie urbaine. Prof. P. Girardin, 559*; Rôle des conditions topographiques dans le développement des villes suisses. P. Girardin, 871*; Terraindarstellung auf Stadtplanen. Prof. E. Oberhammer, 74*; Urbanisme. Étude historique, géographique et économique. P. Clerget, 559*; Wind Velocity and Hygiene in Large Cities, 292 ¶ Maps of Cities: Geographische Verbreitung der Grossstädte. Dr. H. Hassinger, *n.*, 552; Liste alphabétique des plans et vues de Villes, Citadelles et Forteresses qui se trouvent dans le grand Atlas de Mortier. Édition de Amsterdam, 1696. Sir Herbert G. Fordham, 640*
- Claparède, A. de. Oasis des Zibans, 315*; Editor *Compte Rendu des Travaux du Congrès. Neuvi. Congrès Intern. de Géog.*, Vol. 2, 74*
- Clapp, C. H. Geology of Victoria and Saanich Quadrangles, B. C., 948*
- Clapp, E. J. Rhine and Mississippi R. Terminals, 714*
- Clapp, F. G. Occurrence and Composition of Well Waters in the States of Maine, 553*; — in Granites of New England, 635*
- Clark, A. Ceylon, *n.*, 305
- Clark, A. H. Clipper Ship Era, *rev.*, 542
- Clark, G. Yosemite Valley, *rev.*, 61
- Clark, G. R., Sketch of his Campaign in Illinois in 1778-9, 400*
- Clark, R. C. Beginnings of Texas, 1684-1718, 474*
- Clarke, Lieut.-Gen. the Hon. Sir Andrew, Life of —. Col. R. H. Vetch, *editor*, 320*
- Clarke, Dr. J. M., Personal, 529
- Clarke, S., *joint author*, see E. Naville.
- Clavery, E. L'Inde. Sa condition actuelle, *rev.*, 207

- Clavus, Claudius — and the Early Geography of the North. E. Heawood, 228*
- Cleland, H. F. North American Natural Bridges, etc., 474*
- Clément-Simon, F. A propos du Péro, 153*
- Clerget, P. Géographie des textiles, 479*; La navigation actuelle du Rhône, ses améliorations possible, etc., 793*; Production et consommation du cacao, 479*; Urbanisme. Étude historique, géographique et économique, 559*
- Cleveland, F. A., and F. W. Powell. Railroad Promotion and Capitalization in the U. S., *n.*, 218
- Cleveland Normal School, Geographical Equipment of the. W. M. Gregory, 453
- Climate. See also Meteorology: ¶ Aeronautics and Climate, 624; Climate as Related to Industry and Commerce. J. F. Chamberlain, 317*; Climates of the Geological Past. H. J. Jensen, 317*; Cyclonic Unit in Climatology. W. G. Reed, Jr., 372; Einfluss der klimatischen Faktoren auf die Vegetation im allgemeinen und speziell auf die Höhe des Pflanzenertrages. Dr. F. Vageler, 872*; Einfluss des Waldes auf das Klima. Dr. W. R. Eckardt, 73*; Handbuch der Klimatologie. Klima der Gemässigten Zonen und der Polarzonen. J. Hann, *rev.*, 935; Wind und Wetter. Prof. Dr. L. Weber, *rev.*, 787
- Climbs. See Mountaineering.
- Clipper Ship Era, Epitome of Famous American and British Clipper Ships . . . 1843-1869. A. H. Clark, *rev.*, 542
- Close, Col. C. F. Purpose and Position of Geography, 740
- Clouds: Levels of Maximum and Minimum Cloudiness. W. J. Humphreys, 953*
- Clouzot, E. Inondations à Paris du VI^e au XX^e siècle, 638*
- Coal: Formation of Coal Beds. J. J. Stevenson, 640*; Natural History of. E. A. N. Arber, *n.*, 937
- Coast and Geodetic Survey of the U. S.: Results of Magnetic Observations made by — 1909-10. R. L. Faris, 635*; for Charts of the —, see under Charts.
- Coastal Plain: ¶ Early Aspects of Vegetation of South Carolina, Georgia and N. E. Florida. R. M. Harper, 948*; Quantitative Study of the more Conspicuous Vegetation of Cert in Natural Subdivisions of —, R. M. Harper, 553*; Saline Artesian Waters of the Atlantic Coastal Plain. S. Sanford, 553*
- Coast Ranges of California, Extension of the Known Area of Pleistocene Glaciation to the —. R. S. Holway, 161
- Coasts: ¶ Genesis and Development of Sand Formations on Marine Coasts. P. Olsson-Seffer, 953*; Raised Beaches and Head of Cornish Coast. W. Rogers, 316*; Über Stranddünen und ihre Befestigung. W. Stavenhagen, 872*
- Cobb, Prof. C. Physical Geography. Purpose of the, Course — Training for Service, 479*
- Coblentz District: Kulturgeographische Wanderungen im Koblenzer Verkehrsgebiet. Dr. R. Martiny, *n.*, 785 ¶ Map: Koblenz um 1900, *n.*, 878*
- Cochin China. See also Indo-China, French: Plantations de caoutchouc en Cochinchine, 637* ¶ Map: Carte physique, *n.*, 956
- Cochrane, Hon. F. Conservation of Natural Resources of Ontario, 475*
- Coe, W. R. Nemertean. (Harriman Alaska Series), 480*
- Colby, F. M., *Editor*. New International Year Book . . . 1910, 560*
- Coleman, Prof. A. P. Climate and Physical Conditions of Keewatin, 394*; History of the "Canadian Shield," 66*
- Col du Pelvoux. H. Mettrier, 71*
- Coldstream, W. (*Editor*). Records of Intelligence Dep. of the Government. N. W. Provinces of India during Mutiny of 1857, 236*
- Collier, A. J., Personal, 196
- Collier, P. The West in the East from an American Point of View, *rev.*, 932
- Collins, G. N., and C. B. Doyle. Notes on Southern Mexico, 635*
- Collins, W. H. Montreal R. District, 948*
- Colombia, Maps of: Forschungsreise des Dr. Hamilton Rice im Flussgebiet des Rio Caiary-Uaupés, 707*; Peninsula de la Guagira. F. A. A. Simons, 955*
- Colon Harbor, Charts U. S. Coast and Geod. Surv., 158*, 635*
- Colonial Geography: See under Geography.
- Colorado: ¶ Coal Fields of Canon City, and South Park. C. W. Washburne, 152*; Investigations of Coal Fields in — and New Mexico in 1909. G. C. Martin, C. W. Washburne and

- Others, 151*; of Northwestern — and N. E. Utah. H. S. Gale, 313*; Trinidad coal-fields. G. B. Richardson, 151* ¶ Caves and Ruins of Arizona and —. C. Hallock, 394*; Florence Oil Field. C. W. Washburne, 152*; On the Use, Non-Use and Waste of Mineral Resources of. F. Guiterman, 221* ¶ Maps of Colorado: Life Zones of, *n.*, 795; Distribution of certain animals, mainly rodents, 795*; Distribution of certain trees or plants, 795* ¶ U. S. G. S. Maps: Boulder, Danforth Hills, Eaton, Grand Hogback, Rangely, and White River Quadrangles, 75*; Breckenridge Special Map, 75*; Distribution of principal silver, lead and gold regions of, 953*; Geol. Map of Breckenridge District, 954*; Jensen Quad., 76*; Leadville Special Map, 308*; Map showing areas of gypsum in Eagle Co., 874*; Outline Map of Region adjacent to Breckenridge, 954*; Reconnaissance Geologic and Topographic Maps of Part of Danforth Hills Quad., etc., 157*; — of Parts of Grand Hogback, Jensen, Rangely, and White R. Quadrangles, 157*; Topography and Mining Claims of Breckenridge District, 954*; Uncompahgre Quadr., *n.*, 544.
- Colorado River Basin: ¶ History of Grand Canyon District. Prof. D. W. Johnson, 285; Single Cycle Development of Grand Canyon of the. H. H. Robinson, 948*
- Colorado Springs Coal Field. M. I. Goldman, 151*
- Colquhoun, A. R. Rhodesia, 68*
- Colton, W. Three Years in California, 236*
- Columbia, District of: See District of Columbia.
- Columbus, Christopher: Ancienne et nouvelle campagne pour la canonisation de Christophe-Colomb. H. Vignaud, 74*
- Comets: Halley's Comet. G. F. Chambers, 318*; — and the Earth's Atmosphere, 640*; Did the Tail of Halley's Comet affect the Earth's Atmosphere? Dr. J. Aitken, 228*; Return of Halley's Comet. W. W. Campbell, 479*
- Comino, Val di — o Cominese. Prof. R. Almagià, 639*
- Commerce: ¶ Climate as related to Industry and —. J. F. Chamberlain, 317*; Commerce of the World in 1910, 860; Commerce of l'ancienne Égypte avec les nations voisines. Prof. E. Naville, 869*; Dangers of Municipal Trading. R. P. Porter, *n.*, 943; Trade Routes, Past and Present — East and West. R. Kalisch, 399*
- Commercial Geography. See under Geography.
- Communications: See Transportation.
- Comoro Islands: Statistiques du Commerce des Colonies françaises pour 1908. Mayotte et Comores, 636*
- Condra, G. E. Geographic Influences in the Development of Nebraska, 221*
- Confuso, Rio. Carte de la région des marais du Rio Pilcomayo et du —. A. Schmied et Arnold, 67*
- Congdon, F. T. Fur-Bearing Animals in Canada and How to Prevent their Extinction, 475*
- Conger, S. P. Letters from China, *n.*, 698
- Congo: The Medicine-Man and His Black and White Magic. J. H. Weeks, 555*
- Belgian Congo: ¶ Les Bakanoo. Lieut. A. Hutereau, 314*; Les Bangala. Sociologie descriptive. Cyr. van Overbergh et Ed. de Jonghe, *rev.*, 303; Chemins de fer nationaux vers le Katanga. L. Goffin, 153*; Commerce dans le bassin du Kasai, 68*; Le commerce au Katanga. G. de Leener, 869*; Congo Belge en 1910, 223*; Congo Belge. C. Martin, 223*; Le Congo au Parlement. Co cessions minières au Katanga, 314*; Documents ethnographiques congolais: Manyanga, Mafoto. A. Hutereau, 68*; Étude sur les Kuku. J. Vanden Plas, 476*; Freight Automobiles in, 136; Le Général Sanford. Reconnaissance de l'Association du Congo. A. J. Wauters, 791*; Gites métallifères du. C. V. Brien, 790*; La the Heart of Africa. [Congo Exp. Amer. Mus.] M. C. Dickerson, 68*; Les huileries du, 869*; Heutige Katanga. E. Zimmermann, 68*; Immigration au Katanga, 153*; Le Katanga, 68*; Vom Kongo zum Ubangi. F. Thorner, *rev.*, 64; Le "Livre gris" sur la question des chemins de fer du Congo, 791*; Du Lualaba au Moero. E. Sloose, 950*; Matadi-Leopoldville R.R., 620*; Mines de cuivre du Katanga. E. Zimmermann, 153*; Mining Conditions in. S. H. Ball and M. K. Shaler, 153*; Mission an den Staatposten von. P. L. Massman, 153*; Nos missionnaires au. E. Tibbaut, 68*; Navigabilité du Kasai-Sankuru, 716*, 791; Navigation sur le Congo de Léopoldville à Stanley-

- ville, 791*; La numération chez les Peuplades du Lac Leopold II. M. J. Maes, 223*; Pêche et Poissons au Congo Belge. Capt. Wilverth, 716*; La "Pipe Line" du Congo, 716*; Plantations d'État au —, 395*; Present Situation in. Rev. W. L. Ferguson, 716*; Prospects of Rubber Plantations in the Kasai District, 869*; Reserves diamantifères du Katanga, 950*; Vers la suppression complète de l'esclavage au. Lieut.-Gen. Donny, 869*; Le Transcongolais. Navigabilité du bief Kongolo-Bukama, 791*; Vallée de la Lukuga et le chemin de fer du Tanganika. A. Delcommune, 790*; Véritable signification du Katanga pour la Belgique. P. Fort-homme, 950* ¶ Maps of Belgian Congo: Carte du Bas-Congo. H. Droogmans, 471*; Carte du District du Katanga. H. Droogmans, *n.*, 471; Chart of River Aruwimi. R. L. Reid, 797*; Duke of Mecklenburg Expedition's field Work. Lieut. M. Weiss, *n.*, 956; Franz Thonner's Aufnahmen zwischen dem Kongo und dem Ubangi, *n.*, 159; Mining Localities and Approximate Geol. Boundaries in, *n.*, 471; Railroads and Mining Concessions, *n.*, 471; Neue Grenze zwischen Belgisch-Kongo u. Deutsch Ost-Afrika, 547*; Sprachenkarte des Gebietes zwischen Kongo und Ubangi. Übersichtskarte des —. F. R. Thonner, *n.*, 159; Voies d'accées vers le Katanga, *n.*, 78
- French Congo: See French Equatorial Africa.
- Congo River: ¶ Navigation sur le Congo et le Stanley Pool. C. Martin, 716*; Navigation sur le — de Léopoldville à Stanleville, 791*
- Congresses: ¶ Compte Rendu des Travaux du Congrès, Neuvi. Congrès Intern. de Géog., 1908. A. de Claparède, *editor*, 74*, 872*; Exkursion des XI. Intern. Geol.-Kongresses nach Spitzbergen. Dr. F. Wahnschaffe, 479*; —. Prof. R. S. Tarr, 31; Geological Congress at Stockholm, 227*; French Geographical Congress, 203; Il VII Congresso Geog. Italiano, 478*; Tenth International Geographical Congress postponed, 922; Le XVI^e Congrès International des Américanistes. Dr. Capitan, 228*
- Connecticut: ¶ Connecticut by Daylight. T. McQuill, 400*; Geological and Natural History Survey of. Prof. W. N. Rice, 521 ¶ Maps of Connecticut: Prel. Geol. Map of —. H. E. Gregory and H. H. Robinson, 954*; Charts U. S. Coast and Geod. Surv.: Fishers Is. Sound, 875*; North Shore of Long Island Sound, 76*
- Connecticut R. Chart: Entrance to Deep R., 875*
- Conversation, Travellers' Practical Manual of —, in English, French, German and Italian, *n.*, 149
- Conybeare, E. Early Britain. Roman Britain, *n.*, 701
- Cook's Handbook for Tourists to Peking, Tientsin, Shan-Hai-Kwan, Mukden, Dalny, Port Arthur and Seoul, *n.*, 376
- Cook, O. F. History of Coconut Palm in America, 394*
- Cook, S. A. Glossary of the Aramaic Inscriptions, 320*
- Cook, W. A. Through Wildernesses of Brazil, *rev.*, 302
- Cooke, W. W. Distribution and Migration of North Amer. Shorebirds, 66*; Our Greatest Travelers. Birds that fly from Pole to Pole, 788*
- Cooper, J. A. Recent Developments in West Africa, 69*
- Copan, the Mother City of the Mayas, S. G. Morley, 789*
- Copley, J. Kansas and the Country beyond . . from Missouri to Pacific Ocean, etc., 318*
- Coquille, D. W., *joint author*, see Wm. Ashmead.
- Cora, Prof. G. Notizie sulla Repubblica di Liberia. Specialmente Secondo i Viaggi e gli Studi di J. Büttikofer, 637*; Da Trento al Brennero, 719*; — *Cosmos*, 370
- Coral and Corals. Their History, Description, . . . Influence of Winds, Tides . . . on Their Formation, etc. F. Wood-Jones, *rev.*, 944
- Coral Reef, Pleistocene Glaciation and — Problem. R. A. Daly, 399*
- Cordillera. See also Andes: Beiträge zur Kenntnis der Argentinischen —. F. Kühn, 555*; *rev.*, 847; Patagonischen Anden zwischen dem 42. u. 44. Grade s. Breite. Dr. P. Krüger, 949*; Vorkordillere zwischen Flüssen Mendoza u. Jachal in Argentinien. Dr. R. Stappenbeck, 950*
- Córdoba, G. L. F. Wirtschaftliche Erschliessung Patagoniens, 869*
- Corea. See Korea.
- Cornish Coast, Raised Beaches and Head of. W. Rogers, 316*
- Cornish, Dr. V. Panama Canal, 395*; — and Its Makers, *rev.*, 62
- Cornwall: ¶ Grundzüge der Oberflächengestaltung Cornwalls. H. Speth-

- mann, 851; Via — to Egypt. C. F. Gordon-Cumming, 400*
- Coromandel Coast, Narrative of Military Operations on the —, against the combined forces of the French, Dutch and Hyder Ally Cawn, from 1780 to the Peace in 1784. I. Munro, 480*
- Correa Morales, E. G. A. de. República Argentina, 868*; Unterricht der Geographie in Argentinien, usw., 868*
- Corsica: ¶ Anciens glaciers de la Corse et les oscillations pleistocènes de la Méditerranée. R. Lucerna, 560*; Eiszeit auf Korsika und das Verhalten der Exogenen Naturkräfte seit dem Ende der Diluvialzeit. Dr. R. Lucerna, 315*; Insel Korsika. F. Mielert, 315*; Vorläufiger Bericht über eine Studienreise nach. Dr. E. Scheu, 397* ¶ Map of Corsica: Eiszeit-Karte von, 234*
- Cortier, Capt. M. Itinéraire dans l'Adrar (Map), 79*
- Coryndon, R. T. Agricultural Labour Conditions in Swaziland, 555*
- Cosmographiæ Introductio. Waldseemüller, Saint-Dié's Celebration of the Printing of —, 290
- Cosmos: Sketch of Physical Description of the Universe. A. von Humboldt, 320*
- Cosmos, Prof. G. Cora's, 370
- Costa Rica: ¶ Anuario Estadístico, 1909, 475*; Contribution à l'Étude de l'acclimatement du Bétail européen au. F. Peralta, 554*
- Coulson, C. J. D. Korea, *n.*, 377
- Coutlee, C. R. Water Wealth of Canada with Special Reference to Ottawa R. Basin, 475*
- Covert, C. C., A. H. Horton and R. H. Bolster. St. Lawrence R. Basin, 1909, 635*
- Cowles, Dr. H. C., Personal, 692
- Cox, A. J. Philippine Firewood, 951*
- Cox, G. H. Elizabeth Sheet of Lead and Zinc District of N. Illinois, 553*
- Cox, H. J. Frost and Temperature Conditions in Cranberry Marshes of Wisconsin, 635*; Relation of Climate to Cranberry Growing, 196
- Craig, J. I. Notes on Temperature at Alexandria, 636*
- Cranberry, Relation of Climate to — Growing. H. J. Cox, 196
- Crawford, A. Our Troubles in Poona and Deccan, 319*
- Crider, A. F. Cement and Portland Cement Materials of Mississippi, 880*
- Crimea: Geographische Charakterbilder aus der Krim. Dr. G. Fester, 952*
- Croatia, Map: Geol. Map of the Spa of Stubicke Toplice, 473*
- Crommelin, A. C. D. Address on Return of Halley's Comet in 1910, 399*
- Crooke, W. Anthropology, 72*
- Cross, A. L. Visit to Lapland, 398*
- Crowfoot, J. W. Some Red Sea Ports in Anglo-Egyptian Sudan, 716*
- Cuba: ¶ Cuba. I. A. Wright, *rev.*, 533; Nipe Bay Country. I. A. Wright, 949*; Zuckerrohrkultur und Zuckerindustrie auf Cuba. R. J. Holty-Camagüey, 67*
- Cufino, L. Confine occidentale della Tripolitania e le Oasi del Kaur, 69*; Depressioni ad Oriente del Ciad. Eguei ed il Toro, 69*; Occupazione dell' Uadai, 68*
- Cullum Geographical Medal, awarded to Prof. Dr. Hermann Wagner, 52, 283
- Culture of the Nations. M. Jefferson, 241
- Cumming, C. F. G. From Hebrides to the Himalayas. Wanderings in Western Isles and Eastern Highlands, 320*; Wanderings in China, 236*
- Cundall, F. Colonization of the Caribbean, 395*
- Cunningham, A., Plan showing —'s Route and Site of First Discovery of Gold in Australia, 957*
- Cunningham, W. M. Agricultural Labour and Other Conditions of Bahamas, 554*
- Curaçao, Topographische Opneming van het Eiland. J. V. D. Werbata, 152*
- Current Geographical Papers, 66, 151, 221, 313, 394, 474, 553, 635, 714, 788, 867, 947. For classified List see Geographical Papers, Current.
- Currier, Rev. C. W. Museum of La Plata, 636*
- Curtis, G. C. Land Reliefs that are True to Nature, 418; Relief Model showing Effects of Valparaiso Earthquake, 525
- Curzon of Kedleston, Right Hon. Lord George N. —'s Administration of India. Syed Sirdar Ali Khan, *rev.*, 783, Personal, 530
- Cushing, H. P., H. L. Fairchild, R. Ruedemann and C. H. Smyth, Jr. Geology of Thousand Islands Region, 222*
- Cushman, A. S. Conservation of Iron, 867*
- Cutter, V. M. Quirigua, 554*
- Cuvillier-Fleury, R. Le Bassin de l'Ombella, 791*
- Cuzco, Algunos materiales para la antropología del. A. Lorena, 715*

- Cvijić, J. Ancien lac Égéen, 872*; Carte du Lac Égéen; Les Lacs Égéen et Pannonien au Miocène, 710*; Pleistozäne Hebungen und Vergletscherung, 73*
- Cyclones, Sugar Cane and Insurance. (Sugar Industry of Mauritius). A. Walter, 918
- Cyclonic Unit in Climatology. W. G. Reed, Jr., 372
- Cyprien, R. P. Une nouvelle fondation aux pays Gallas (Abyssinie), 67*
- Cyzicus. Account of History and Antiquities of — . . . and District Adjacent to it, etc. F. W. Hasluck, *n.*, 930
- Czekanowski, J. Beiträge zur Anthropologie von Zentral-Afrika, 68*
- D.
- Dahomey: Statistiques du Commerce, 1908, 636*; Togo-Dahomey Grenzvermessungs-Expedition, etc. A. v. Seefried, 870*
- Daireaux, G. Estancias in Argentina, 314*
- Dalai-Lama oder Taschi-Lama?, 70*
- Dalhousie, N. B., Sketch Map of —, showing relation of the eruptive mass . . . to the Devonian marine sediments, 796*
- Dall, Wm. H., Land and Fresh Water Mollusks, 480*; —, C. Keeler, *et al.* History, Geography, Resources (Harriman Alaska Series), 480*
- Dalla Vedova, G., C. Bertacchi, and Others. Riforme urgenti per la geografia nelle Università Italiane, 952*
- Daly Medal, Awarded to Dr. Grove K. Gilbert, 51
- Daly, R. A. Pleistocene Glaciation and Coral Reef Problem, 399*
- Damaraland, Kalkpfannen des östlichen —. Dr. H. Michaelsen, 154*; S. Passarge, 154*
- Damas, D. Oceanography of the Sea of Greenland, 479*
- Danès, Dr. J. V. Geomorpholog. Studien im Karstgebiete Jamaikas, 67*
- Danube: Commission européenne du —. Porumbaru, 226* ¶ Map of Danube: Les environs du confluent du — et de la Tisza. Carte morphologique, 957*
- Darbishire, B. V. English adaptation of Stieler's Atlas of Modern Geography, *n.*, 235
- Dar-es-Salaam: ¶ Zur Geologie und Hydrologie von Daressalam und Tanga. W. Koert and F. Tornau, *n.*, 927; Le Transafricain de Matadi à —. A. J. Wauters, 716* ¶ Maps of Dar-es-Salaam; Skizze von Daressalam mit den in den Jahren 1901-5 ausgeführten Bohrungen, 956*; Skizze von Tanga mit den 1902-3 ausgeführten Wasserbohrungen, 956*
- Darfur, Map: Frontière Ouadai-Darfur, 78*
- Darmstadt, Notizblatt des Vereins für Erdkunde und der Grossh. geol. Landesanstalt zu — für 1909, 227*
- Darton, N. H. Geological Work along the Santa Fé R.R., 195; Geol. Map of Part of N. W. New Mexico and N. Arizona, 157*
- Darwin, Maj. L. Suggestions for the Future Work of the Royal Geog. Soc., 779
- Darwin, Sir George. Tidal Observations of the British Antarctic Exp. 1907, 398*
- Dauphiné, Ascensions nouvelles dans le. E. Santi, 793*; Études récentes sur les glaciers du. C. Jacob, 73*
- Davis, Capt. J. K., Description of Macquarie Island, 126; Voyage of the S. Y. "Nimrod," 228*
- Davis, M. K., *joint author*, see C. R. Dryer.
- Davis, R. A. Fruit Culture in Swaziland, 717*
- Davis, W. G. Climate of the Argentine Republic, 314*; *rev.*, 533
- Davis, W. M. Antarctic Geology and Polar Climates, 478*; Notes on the Description of Land Forms, 46, 190, 598, 679, 847; Rational Study of Topographic Forms, 361; Personal, 623, 692, 861
- Davison, C. Characteristics of British Earthquakes: Summary of Twenty-One Years' Work, 478*
- Day, D. T. Analyses of Crude Petroleum from Oklahoma and Kansas, 151*
- Day, P. C. Frost Data of the United States, 523
- Death Valley Region, 129
- Decazeville, Coal Basin of. J. J. Stevenson, 793*
- Deccan, Our Troubles in Poona and the —. A. Crawford, 319*
- Deeken, R. Der Handel Samoas, 226*
- Degel, Dr. H. Atlas, Lernbuch und Schüler, 399*
- Delafosse, M. Confréries musulmanes et le Maraboutisme dans les pays de Sénégal et du Niger, 716*
- Delaware: Results of Spirit Levelling in —, District Columbia, Md., and Va. R. B. Marshall, 66*; Archæology of — Valley. E. Volk, 800*

- Delaware R., Penns Neck to Philadelphia, Chart U. S. Coast and Geod. Surv., 545
- Delcommune, A. La vallée de la Lukuga et le chemin de fer du Tanganika, 790*
- Delta Formation, Some Features of. C. R. Dryer, 228*
- Demanche, G. Tunisie, 155*
- Demangeon, A. Impressions d'Irlande, 872*
- Demers, l'abbé B. Paroisse de St. Romuald d'Etchemin, *n.*, 924
- Demontès, V. Algérie, 790*
- Deniker, J. Tremblement de terre de Vernyi, 637*
- Denis, P. Le Brésil au XX^e siècle, *rev.*, 626; translation, *rev.*, 924
- Denmark: ¶ Description of Topographic and other maps issued by the Top. Dep. of the Gen. Staff [in Danish], 558*; Population of, 1911, 689 ¶ Map of Denmark: Danmark i 35 Kort over Nordslesvig, *n.*, 713
- Dennett, R. E. Nigerian Studies; or, The Religious and Political System of the Yoruba, *rev.*, 460
- Dennis, J. S. Rev. Centennial Survey of Foreign Missions, 320*
- Densmore, F. Chippewa Music, 474*
- Denucé, J. Ressources économiques du Spitsberg, 398*
- Denudation, Erosion, Corrosion, and Corrasion. J. W. Gregory, 399*; Écoulement fluvial et dénudation, d'après les travaux de l'U. S. Geol. Survey. H. Baulig, 560*
- Derby, O. A. Contribuições recentes para a cartographia do Brazil, 152*
- Deschamps, E. Impressions de Californie. Ascension du Tamalpais, 553*
- Descombes, P. Surcharge des pâturages et l'aménagement des montagnes, 72*
- Desert Ranges, Relations of Present Profiles and Geological Structures in. C. R. Keyes, 474*
- Desparmet, J. Œuvre de la France en Algérie jugée par les Indigènes, 869*
- Detchebarne, Lieut. Jonction du territoire de Zinder, 69*
- Detroit R., Map of: Lower — showing available Channel and Positions of Aids to Navigation, 875*
- Devins, J. B. Classic Mediterranean, *n.*, 540
- De Windt, H. Siberia as It Is, 236*
- Dew-Ponds, Further Experiments on. E. S. Martin, 317*
- Dexter, Hon. Edwin G. Education in Porto Rico, 636*
- D'Halluin, Dr. M. Photographie en Cerf-Volant, 872*
- Díaz del Castillo, Bernal. Historia Verdadera de la Conquista de la Nueva España por — uno de sus Conquistadores. La publica Genaro García, 480*
- Dickerson, M. C. In the Heart of Africa [Congo Exp. Amer. Mus.], 68*
- Dickinson, P. L., joint author, see J. M. Hone.
- Dictionaries: ¶ Classical Dictionary . . . Greeks and Romans with account of coins, weights and measures, etc. C. Anthon, 320*; Concise Dictionary of Old Icelandic. G. T. Zoëga, *n.*, 213; Meyers Grosses Konversations-Lexikon. Sechste Aufgabe, 320*
- Diest, A. D. von. Kartographie in der Türkei, 227*; — des nordwestlichen Kleinasien, 870*
- Dietrich, Dr. B. Morphologie des Moselgebietes zwischen Trier und Alf, 478*
- Diguët, L. Histoire de la cochenille au Mexique, 554*
- Diller, J. S. Types, Modes of Occurrence, and Important Deposits of Asbestos in the U. S., 867*; —, C. Butts, and Others. Miscellaneous Nonmetallic Products, 867*; — and M. A. Pishel. Prel. Report on Coos Bay Coal Field, Ore., 867*; Map of Coos Bay Coal Field, Ore., 630*; Map of Northern Part and Map of Middle Part of Coos Bay Coal Field, 630*
- Dines, W. H. Registering Balloon Ascents, 1909, and 1910, 640*
- Dingelstedt, V. Ruling Nations: Considerations on Their Characters, 872*
- Dinkas, Les. Col. Largeau, 790*
- Dirr, Dr. A. Linguistische Probleme in Ethnol., anthrop. und geogr. Beleuchtung, 318*
- District of Columbia: Results of Spirit Levelling . . . 1896 to 1909. R. B. Marshall, 66
- Dix, A. Politische Wirtschaftsgeographie, 317*
- Dixon, R. B. Shasta Myths, 394*
- Dixon, W. G. Land of the Morning. Account of Japan and its People, 236*
- Dobel, P. Travels in Kamtchatka and Siberia, with Narrative of a Residence in China, 236*
- Dobrynin, B. Andalusian *Cordillera. [In Russian], 316*
- Dodd, W. E. The Fight for the Northwest, 1860, 948*
- Doire Baltée en aval d'Aoste. Une Vallée tectonique. E. Argand, 478*

- Dominican Republic. See Santo Domingo.
- Domville-Fife, C. W. Great States of South America, Account of their Condition and Resources, etc., *rev.*, 459
- Donnet, G. En Chine, 400*
- Donny, Lieut.-Gen. Vers la suppression complète de l'esclavage au Congo Belge, 869*
- Douarche, E. Les facteurs essentiels de l'acclimatement du bétail européen au Tonkin, 315*
- Douglas Fir, Height and Dominance of. T. C. Frye, 221*
- Douglas, J. Conservation of Natural Resources, 474*
- Douglass, W. B. Sketch Map of Navaho National Monument, Ariz., 632*
- Doury, le Capitaine. Du Guir à la Mauritanie, 476*
- Dove, Prof. Dr. Medizinische Geographie, 794*
- Dowling, D. B. Coal Fields of Jasper Park and Edmonton, Alberta, 554*, 948*
- Doyle, C. B., *joint author*, see G. N. Collins.
- Dresser, J. A. Serpentine Belt of Southern Quebec, 948*
- Drews, Lieut. Erkundung der Hunsberge, 396*
- Dreypondt, Dr. G. Maladie du Sommeil, 228*
- Droogmans, H. Carte du Bas-Congo, 471*; Carte du District du Katanga, *n.*, 471
- Drushel, J. A. Studies in Glacial Geology in St. Louis and Vicinity, 867*
- Dryer, C. R. Some Features of Delta Formation, 228*; — and M. K. Davis. Physiographic Survey of an Area near Terre Haute, Ind., 313*
- Drygalski, E. v. Schelfeis der Antarktis am Gaussberg, 478*; Zeppelin Study Expedition to Spitzbergen, 198; Die Zeppelin-Studienfahrt nach — und ins nördliche Eismeer, 1910, 398*
- Drzewicki, Vs. *Rybnyia Promysly Murmana i yezo Kolonizaxia* [Fisheries and Colonisation of the Murman Coast], 316*
- Dubois, E. Hollandsche Duinen, Grondwater en Bodemdaling, 719*
- Dubois, F. Tombouctou en 1909, 396*
- Dubrouillet, J. Reconnaissances sur l'Ogowé, 555*
- Duchesne-Fournet. Principali studi pubblicati in occasione della missione — in Abissinia. C. C. Rossini, 67*
- Duerden, Prof. J. E. Application of Science to the Ostrich Industry, 396*
- Duffart, C., et F. Bergeron. Les Dunes continentales de Moret-sur-Loing, front oriental de la forêt de Fontainebleau, 718*
- Dühring, Lieut. Entwicklung Nordkameruns, 555*
- Dumas, J. M. Woordenlijst verzameld op de Mimika en Atoeka-Rivieren (Zuid-West-Nieuw-Guinea), 156*
- Dunes. See Sand Dunes.
- Dupaigne, A. Les Montagnes, 239*
- Dupuy, E. Pacification de la Côte d'Ivoire, 396*
- Durance, La. Utilisation de ses eaux, amélioration de son régime, etc. I. Wilhelm, 559*
- Durango, Mexico: Estudio Geologico de la Region de San Pedro del Gallo. Dr. C. Burckhardt, 222*
- Durstine, W. E. Lake Erie and its Southern Ports, 714*
- Dutch East Indies: See East Indies, — Guiana, see under Guiana, — New Guinea, see under New Guinea.
- Dutt, W. A. The Norfolk and Suffolk Coast, *rev.*, 382
- Dyer, G. L. Guam, 558*
- Dyk, G. van. Magnetic Character of Year 1909, 317*
- Dzungaria: The Glacial Group of Muss-Tau. Bl. Rieznicenko. [In Russian], 224*

E.

- Eakin, H. M., *joint author*, see P. S. Smith.
- Earth: ¶ Abhängigkeit einiger geographischen Elemente von dem barischen Relief der Erdoberfläche. Prof. P. Brounow, 73*; Abundance of Meteorites on Painted Desert, and its Bearing upon Planetesimal Hypothesis of Origin of the Earth. C. R. Keyes, 560*; Bearing of Tertiary Mountain Belt on the Origin of Earth's Plan. F. B. Taylor, 228*; Did the Tail of Halley's Comet affect the Earth's Atmosphere? Dr. J. Aitken, 228*; Das Erdbild in Mondentfernung. W. Krebs, 953*; The Face of the Earth. E. Suess. Transl. by H. B. C. Sollas, Vol. IV, *rev.*, 540; Bearing of Tertiary Mountain Belt on the Origin of Earth's Plan. F. B. Taylor, 228* ¶ Map of the Earth: Kuhnert physikalische Erdkarte in Mercators Projektion mit Darstellung der Meeresströmungen. Dr. G. Leipoldt, *n.*, 235
- Earth Movements: Über Bodenbewegungen. Dr. G. Braun, 317*

- Earth Pillars: Über Erdpyramiden. Dr. Graf W. zu Leiningen, 74*
- Earthquakes: ¶ Alaskan Earthquakes of 1899. L. Martin, 151*; Catastrofe sismica Calabro Messinese. M. Baratta, *n.*, 145; La ciencia y los temblores. R. G. Rosell, 715*; Chronological and Historical Account of most Memorable Earthquakes that have happened . . . to 1750, etc., and a letter concerning Earthquakes written in 1693 by J. Flamsteed, 720*; Danni prodotti dai terremoti nella Basilicata e nelle Calabrie. Prof. G. Mercalli, *n.*, 145; Earthquake Epicentres. O. Klotz, 399*; Erdbeben-tätigkeit in Deutsch-Neuguinea. A. Sieberg, 226*; Geschwindigkeit der Erdbebenwellen in Verschiedenen Tiefen. Prof. W. Trabert, 318*; Informe que la Comisión del Observatorio sismográfico presenta a la Sociedad geog. de Lima, 715*; Microseisms. O. Klotz, 399*; Recent Earthquakes. J. Milne, 640*; Relief Model showing Effects of Valparaiso —. G. C. Curtis, 525; Die schwedischen Erdbeben. R. Kjellén, 398*; Study of Damage to Bridges during —'s. Prof. W. H. Hobbs, 74*; Temblores en el Perú, 790*; Terremotos del Año de 1908 (Mexico). M. Miranda y Marrón, 152*; Tremblement de terre de Vernyi. J. Deniker, 637*; Usu-San Eruption and Earthquake and Elevation Phenomena. F. Omori, 951*; Über die Ursachen des Kalifornischen Erdbebens. A. Rothpletz, 714* ¶ Maps of Earthquakes: Carta de la región abarcada por el temblor del 26 de Marzo de 1908 [Mexico]. J. F. Romani, 159*; Map showing Relation of Volcanic and Seismic Phenomena in West Hokkaido, 797*
- East, The: Vie politique Orientale en 1909. Dr. G. Samné et Y. M. Goblet, *n.*, 934
- East Indies, A Man of War in the. Being the Log of Commission of H. M. S. "Proserpine," 1908-10, etc. A. W. Furness, *n.*, 219
- East Indies, Dutch: ¶ Ausrüstung und Reisepraxis. Erfahrungen auf Forschungsreisen in Niederländisch-Ost-Indien. Dr. W. Volz, 638*; Beschrijving der Eilanden Andonara en Lomblem, behoorende tot de Solor-Groep. J. D. H. Beckering, 638*; De Breukenkust van Mandar. E. C. Abendanon, 637*; Catalogus der Koloniale Bibliotheek . . . Kon. Inst. voor de Taal, Land en Volkenk. van Ned. Indië.
- Aanwinsten, 156*; Jaarverslag van den Top. Dienst in Nederl.-Indië over 1909, 396*; Voyage de l'Ambassade de la Compagnie des Indes Orientales Hollandaises . . . 1794, etc. André Everard van Braam Houckgeest. Publié en français par M. L. E. Moreau de Saint-Méry, 237* ¶ Maps of Dutch East Indies: Map of Amboina and the Moluccas, 472*; Solor-Eilanden. Schetskaarten van het Adonara en Lomblem, 392*; Stand van het Kaarteeringswerk in den Nederlandsch O. I. Archipel, *n.*, 160
- Easter Island (Rapa-Nui) and Rapa (Rapa-Iti) Island. S. P. Smith, 397*
- Eaton, E. H. Birds of New York, 960*
- Eckardt, Dr. W. R. Einfluss des Waldes auf das Klima, 73*; Bird Migrations and Weather, 198
- Eckert, M. Kartenprojektion. Ein geogr.-kartograph. Kapitel . . . Kart-enwissenschaft, 317*
- Economic Geography. See under Geography.
- Edler, F. Dutch Republic and American Revolution, 800*
- Edlinger, L. Wanderung durch das östliche Bosnien, Montenegro und Albanien, 477*
- Edmonton City, Alberta. Map: Plan of the City, and Map showing depth of Clover Bar coal seam, etc., 230*
- Edmonton Coal Field, Alberta. D. B. Dowling, 554*
- Edwards, D. M. Toll of the Arctic Seas, *n.*, 786
- Edwards, F. A. Mystery of Zimbabwe, 951*
- Eerde, J. C. van. Vingermutilatie in Centraal Nieuw-Guinea, 638*
- Égée, Ancien lac —. J. Cvijić, 872*; Map, *n.*, 710
- Eginitis, D. Latitude et longitude d'Athènes, 73*
- Egypt: ¶ Archæological Report 1909-10, 555*; Arts and Crafts of Ancient. W. M. F. Petrie, *rev.*, 206; Le commerce de l'ancienne Égypte avec les nations voisines. Prof. E. Naville, 869*; Egypt Exploration Fund. General Index to Archæological Reports. Vols. I-XVIII. W. L. Nash, Compiler, 960*; Thirtieth Memoir. XIth Dynasty Temple at Deir El-Bahari, Part II. E. Naville and S. Clarke, 236*; Egypt, Nubia and Ethiopia. J. Bonomi *et al.*, 319*; Englische Bewässerungsanlagen in Aegypten und im Sudan mit besonderer Berücksichtigung des Assuan-Staudammes, usw.

- G. R. Rein, 395*; Guide to Antiquities of Upper — from Abydos to the Sudan Frontier. A. E. P. Weigall, *n.*, 927; From Hausaland to — through the Sudan. H. K. W. Kumm, *rev.*, 535; Movements of Subsoil in Upper —. H. T. Ferrar, 950*; The People of. L. Thackeray, *n.*, 303; Phosphate Deposits, 636*; Report on the Work of Survey Department in 1909, 223*; Survey of Egypt. Capt. H. G. Lyons, 67*; Via Cornwall to Egypt. C. F. Gordon-Cumming, 400*; Wirtschaftliche Verhältnisse in Ägypten und den ägyptischen Sudan. M. Schanz, 950* ¶ Maps of Egypt: Égypte et Soudan Égyptien. Atlas Univ. de Géog. V. de Saint-Martin et Fr. Schrader, *n.*, 312; Egypt Survey Dep. 6 sheets, 78*; Geol. Map of Egypt. W. Delta and Libyan Desert, E. Delta and North Arabian Desert, Western Oases, Arabian Desert and Libyan Desert, 391*; Geol. Map of Egypt, 391*; Maps showing location of Wells, 876*; Map of Upper — showing position of localities from which Data on subsoil water were collected 876*; Top. Map of Egypt. El Derr, Korosko, Toshka, Adendan, 391*
- Eisack: Tal und Glazialstudien im unteren Eisackgebiete. Dr. F. Machaček, 315*
- Ekoi, Land of the — Southern Nigeria. P. A. Talbot, 155*
- Elam, Conférence du P. Scheil de l'Institut sur les fouilles et l'histoire de la Babylonie, l'Assyrie et de l'—, 791*
- Electrical Theory, Treatise on — and the Problem of the Universe. G. W. de Tunzelmann, *n.*, 788
- Elkington, E. W. Canada. The Land of Hope, *rev.*, 300; See also N. H. Hardy, *joint author.*
- Ellice, Gilbert and — Islands, 397*
- Ellsworth, C. E. Water Supply of Yukon-Tanana Region, 1909, 635*
- Elm, Der Bergsturz von — den 11. September 1881. E. Buss and A. Heim, 238*
- Emerson, B. K., C. Palache, *et al.* Geology (Harriman Alaska Series), 480*
- Emerson, F. V. Geographic Influences in American Slavery, 13, 106, 170; Manual of Physical Geography, 453
- Emmons, Dr. Samuel Franklin *Obituary*, 294
- Emmons, W. H. Some Ore Deposits in Maine and the Milan Mine, N. H., 313*
- Encyclopædias: ¶ Catholic Encyclopædia. Intern. Work of Reference on Constitution, Doctrine . . . Catholic Church. Vol. IX, 240*, Vol. X, 400*, Vol. XI, 640*; Encyclopædia of Religion and Ethics. Vol. III. J. Hastings, J. A. Selbie and Others, *Editors*, 320*
- Endriss, Dr. W. Quer durch Bithynische Halbinsel, 155*
- Engell, M. C. Bemerkungen über die geographische Lage der Niederlassungen in Westgrönland, 72*; Über die Entstehung der Eisberge, 399*; Nördliches u. südliches Westgrönland (Maps), 80*
- Engerrand, J., and F. Urbina. Informe acerca de una excursión geol. prel. efectuada en El Estado de Yucatan, 868*
- England, Old Country Inns of. H. P. Maskell and E. W. Gregory, *n.*, 933; Book of the English Oak. C. Hurst, *n.*, 944
- Engler, A., and G. Volken. Land-u.-Forstwirtschaftlichen Versuchstationen der deutschen Kolonien, 478*
- Engler, Prof. Dr. Divisions phytogéographiques de l'Afrique, 67*
- Erichsen, Mylius, Expédition danoise de — à la côte nord-est du Groenland. Lieut. Trolle, 559*
- Erie Lake and Its Southern Ports. W. E. Durstine, 714*
- Erie-Michigan Canal. W. T. Harris, 960*
- Erkes, H. Meine vierte Islandreise, 1910, 226*
- Ernst, R. Un voyage à travers le Canada français, 949*
- Errera, C. Epoca delle grandi Scoperte Geografiche. *n.*, 787; Portolani italiani del Medioevo. Secondo l'opera di K. Kretschmer, 953*
- Erzgebirge, Das siebenbürgische —. H. Wachner, 316*
- Escale, B. de l'. Afrique Occidentale Française et la Nigeria Anglaise, 68*
- Espinhosa, Itinerario da Expedição — em 1553, 153*
- Estancia Valley, N. M., Maps, 954*
- Etchemin, Paroisse de St. Romuald de. L'abbé B. Demers, *n.*, 924
- Ethiopia. See also Abyssinia: ¶ Khont-Hon-Nofer. The Lands of Ethiopia. H. K. W. Kumm, *rev.*, 925; Egypt, Nubia, and Ethiopia. J. Bonomi *et al.*, 319*
- Ethnograph., Geograph.-Gesellschaft in Zurich, *Jahresbericht*, 1909-10, 316*

- Etiévant, J. Commerce tripolitaïn dans le centre africain, 69*
- Etna: Eruption of, 858
- Etoshapfanne, Im Gebiet der. D. Hutter, 69*
- Eude, E. Anciennes Capitaines de l'Amazone, 476*
- Eurasia, Northern: Maps accompanying "Ausbreitung kalter Luft in Russland u. Nordasien, 879*
- Europe: ¶ Alphabets en usage dans les principales langues . . . Europe Centrale et les Balkans . . . transcription phonétique. Com. P. Pollacchi, 226*; Some Aspects of Glacial History of Western Europe. Prof. T. G. Bonney, 70*; Comparison of North American and European Glacial Deposits. F. Leverett, 317*; Sur la dernière période glaciaire en Europe et dans l'Amérique du Nord en rapport, etc. N. J. Krischtafowitsch, 317*; Einfluss glazialer und postglazialer Verhältnisse auf die niedere Tierwelt Mitteleuropas, speziell auf deren geog. Verbreitung. Dr. V. Brehm, 718*; Ergebnisse neuerer simultaner Temperaturmessungen in einigen tiefen Seen Europas. Dr. W. Halbfass, 317*; Europe. H. J. Snape. Blackie's Causal Geographies Regionally Treated, n., 866; On Evidences of a Former Land-Bridge between Northern Europe and America. R. F. Scharff, 228*; Geographical and Comparative List of Birds of Europe and North America. Charles Lucien Bonaparte, 320*; Geographical Excursion from Wales to Italy, 919; First Impressions on a Tour upon the Continent in 1818, etc. M. Baillie, 319*; Recent Discoveries Bearing on Antiquity of Man in Europe. G. G. MacCurdy, 477*; Der Kajak im nördlichen. D. MacRitchie, 952*; Scientific Forestry in —: Its Value and Applicability in Canada. Dr. B. E. Fernow, 558*; Steam Voyages on the Seine, the Moselle and the Rhine; with Railroad Visits . . . Cities of Belgium. M. J. Quin, 239*; Wodurch ist die hohe Wärme Europas und des Nordatlantischen Ozeans bedingt? W. Köppen, 638* ¶ Maps of Europe: Bathy-Orographical Map of —, n., 879; G. Freytags Automobil-Routenkarte von Mittel-Europa, n., 79; Generalkarte von Mitteleuropa, n., 552; Glaciated Areas in North America and —, 959*; Goode's Base Maps, n., 712; Literary and Historical Atlas of. J. G. Bartholomew, rev., 382; Mitteleuropäische Eisenbahnnetz beim Ausbruch des deutsch-französischen Krieges, 710*; Physik. polit. Schulwandkarte von. Dr. G. Leipoldt u. M. Kuhnert, n., 235; Positions of Meteorological Stations, observations from which are used in preparation of the British daily weather report, 958*; Verkehrskarte von Mitteleuropa. Dr. G. Leipoldt, n., 235
- Everdingen, Dr. E. van. Drachenbeobachtungen an Bord "de Ruyter" . . . während der Fahrt nach Ost-Indien, usw., 720*; Oberflächentemperaturbeobachtungen in der Nordsee, 228*
- Everett, R. Victoria. Map. Geologically compiled and colored, n., 311
- Evolution of Worlds. P. Lowell, n., 388
- Ewart, A. J. Contributions to the Flora of Australia, 156*
- Exama, H., joint author, see M. Snellen.
- Excavations: La Scava; or, Some Account of Excavation of a Roman Town on the Hill of Châtelet, etc. [Stephen Weston], 239*
- Exner, Dr. F. M. Zum Klima von Palästina, 368
- F.
- Fabarius, Prof. E. A. Arbeiten und Aufgaben in Deutsch-Südwestafrika, 791*
- Fairchild, H. L., joint author, see H. P. Cushing.
- Falconer, J. D. Origin of Major Features of Geography of Northern Nigeria, 396*
- Falls, J. C. E. Siwah. Oasé des Sonnengottes in der libyschen Wüste, rev., 628
- Faque, L. Indo-Chine Française, n., 376
- Faribault, E. R. Goldbearing Series of Lahave Basin, N. S., 949*
- Faris, R. L. Results of Magnetic Observations . . . Coast and Geod. Survey, 1909-10, 635*
- Farnham, A. W. Origin of Geographic Names, 318*
- Farrington, O. C. Meteorite Studies, 318*
- Farsari, A. Guide to Japan, Keeling's, etc. 4th Ed., revised by, 237*
- Fassig, Dr. O. L. Average Annual Rainfall of Porto Rico, 448; Climate of Porto Rico, 524, 790*, 868*
- Fauchère. Enquête sur la valeur commerciale des produits de Madagascar, 154*
- Fauvel. Le port de Changhai, 315*

- Fawcett, Maj. P. H. Further Explorations in Bolivia: Heath River, 555*; Map of — and Adjacent Territory, 391*; — returns from Bolivia, 54
- Fawcett, W., and A. B. Rendle. Flora of Jamaica, 800*
- Fenneman, N. M. Geographic Influences affecting Early Cincinnati, 714*; Geology and Mineral Resources of St. Louis Quadrangle, 788*
- Ferguson, H. G. Gold Deposits of the Philippine Islands, 638*
- Ferguson, J. Ceylon, Malay States and Java compared as Plantation and Residential Colonies, 638*; On Study of the Indian Architecture, 239*
- Ferguson, W. L. The Present Situation in the Congo, 716*
- Fernandina to Jacksonville, — Entrance, Charts U. S. Coast and Geod. Survey, 545*
- Fernow, B. E. Scientific Forestry in Europe: Its Value and Applicability in Canada, 558*; Swedish Forest Conservation Law, 719*
- Ferrar, H. T. Movements of Subsoil Water in Upper Egypt, 950*
- Ferrari, Capt. G. Basso Giuba italiano e le concessioni agricole nella Goscia, 69*
- Fesca, Dr. Zur Düngung der tropischen Kulturpflanzen, 317*; Pflanzenbau in den Tropen und Subtropen, *n.*, 937
- Fester, Dr. G. Geographische Charakterbilder aus der Krim, 952*
- Fetz, A. Idee zur Einrichtung eines "Geographiesalles" in mehrklassigen Schulen, 72*
- Fèvre, J. et H. Hauser. Régions et Pays de France, *n.*, 539; see also H. Busson, *joint author.*
- Fewkes, J. W. Cave Dwellers of the Old and New Worlds, 399*; Preliminary Report on a Visit to the Navaho National Monument, Ariz., 788*
- Fez: ¶ Fez, 951*; With Mulai Hafid at — Behind the Scenes in Morocco. L. Harris, *rev.*, 459 ¶ Map of Fez: Plan de la Ville de, 708*
- Fidel, C. Les intérêts Italiens en Tunisie, 715*
- Filchner, W. Die Deutsche Antarktische Expedition, 228*; Filchner's Plans, 200, 290
- Filippi, F. de. The Duke of the Abruzzi's Expedition to the Karakoram, 225*
- Finland: ¶ Sur la géomorphologie de la Finlande. Dr. J. J. Sederholm, 71*; Finnish Self-Taught. Thimm's System. A. Renfors, *n.*, 149
- Fiore, P. Remarks on Arbitral Sentence . . . on Boundary Question between Bolivia and Peru, 800*
- Fire Island Beach to Rockaway Beach, Chart U. S. Coast and Geod. Surv., 545
- Fischer, Prof. T. Berlin. Principal centre de la circulation continentale en Europe, 558*
- Fish and Fisheries: ¶ Beitrag zur Kenntnis der Fische des Jangtze und seiner Zuflüsse. Dr. Kreyenberg, 70*; Catalogue of Fresh-Water Fishes of Africa in the British Museum. G. A. Boulenger, 314*; Das chinesische Fischerwesen. L. Katscher, 156*; La pêche à marée basse. R. Legendre, 317*; Pêche et Poissons au Congo Belge. Capt. Wilverth, 716*; Report on Herring Investigations until Jan., 1910. J. Hjort, 559*; Saving our Fish (U. S.). D. Wallace, 948*; Untersuchungen über den Hummer. Dr. A. Appellöf, 317*
- Fishers Is. Sound, Chart U. S. Coast and Geod. Surv., 875*
- Fitch, M. H. Chattanooga Campaign, with especial reference to Wisconsin's participation, 880*
- Flamsteed, John. A Letter Concerning Earthquakes written in 1693 by —, 720*
- Flattery, Cape — to Dixon Entrance, Chart U. S. Coast and Geod. Surv., 631*
- Fletcher, W. I., and Others. Annual Library Index, 1910, 560*
- Flind, J. Ferrocarril de la Guaira a Caracas, 636*
- Flora. See Plants.
- Florence Oil Field, Col. C. W. Washburne, 152*
- Florida: ¶ Dos Antiguas Relaciones de Florida. G. García, 480* ¶ Maps of Florida: Geol. Map of North-Central Part of — suggesting oscillations of Ocala dome, 954*; Marianna Area, Soil Survey, 77*; Production of cotton in 1909, 229* ¶ Charts U. S. Coast and Geod. Survey: Fernandina Entrance; Fernandina to Jacksonville; St. Johns R. from Jacksonville to Hibernia; Key West Harbor and Approaches, Main Entrance to Charlotte Harbor, 545*
- Foerster, M. H. Some Facts on Forestry Conditions in Sweden, 719*
- Föhn: See under Winds.
- Follansbee, R., A. H. Horton and R. H. Bolster. Hudson Bay, Hudson Bay and Upper Mississippi, and Minnesota R. Drainage Basins, 867*; Illi-

- nois R., Kaskaskia R., and Wisconsin R. Drainage Basins, 948*; Upper Mississippi R. Drainage Basin, 789*
- Forbes, E. A. Notes on the only American Colony in the World [Liberia], 69*
- Force, P. Grinnell Land. Remarks on English Maps of Arctic Discoveries, 1850-51, etc., 400* (Ford, Worthington Chauncey, *editor*). Diary of Cotton Mather, 1681-1708, 560*
- Fordham, Sir Herbert G. Liste alphabétique des plans et vues de Villes, Citadelles et Forteresses . . . dans le grand Atlas de Mortier. Édition de Amsterdam, 1696, 640*
- Foreign Missions, Centennial Survey of. Rev. J. S. Dennis, 320*
- Forel, Dr. F. A. Association Internationale de Sismologie, 73*; — and E. Muret. Variations périodiques des glaciers, 478*
- Forests and Forestry: ¶Einfluss des Waldes auf das Klima. Dr. W. R. Eckardt, 73*; Forest Fires and their Prevention. J. S. Holmes, 960*; Trees, Forestry and Lumbering, List of Books, etc., 952*; Waldbrände und die Möglichkeit ihrer Bekämpfung. E. O. Rasser, 872*; ¶Richesse forestière de la province de Québec. Hon. J. Allard, 554*; A Railroad's Forest Enterprise, 685; ¶Commercio e l'industria dei prodotti forestali in Italia. Prof. G. Assereto, 227*; ¶Liesnoye Dielo [Forest Problems in Northern Russia], 316*; ¶Recul du pin sylvestre dans les montagnes de la Suède. C. Rabot, 719*; Some Facts on Forestry Conditions in Sweden. M. H. Foerster, 719*; Swedish Forest Conservation Law. B. E. Fernow, 719*; ¶Appalachian Forests, 789*; Present Forest Problems of Massachusetts. A. Chamberlain, 948*, Reforestation in —. F. W. Rane, 789*; Present Forestry Issues. Hon. C. Guild, Jr., 394*; Protecting our Forests from Fire. Hon. J. Wilson, 394*; State Ownership of Forests. A. F. Hawes, 553*; White Pines of Montana and Idaho. Their Distribution, Quality and Uses. F. I. Rockwell, 867*
- Formosa: ¶Les aborigènes de —. R. Torii, 717*; Among the Sons of Han. Notes . . . Residence . . . China and Formosa. Mrs. T. F. Hughes, 237*; L'île Formose. Halot, 225*; Statistical Report on [in Japanese], 720*
- ¶Map of Formosa: Carte ethnographique de Formose, 550*
- Forrest, R. E. Industrial Development in India, 477*
- Forstner, W. Occurrence of Oil and Gas in South Midway Field, Kern Co., Cal., 553*
- Fortescue, G. Galapagos Islands, 557*
- Forthomme, P. Véritable signification du Katanga pour la Belgique, 950*
- Foster, W. English Factories in India, 1634-1636, 560*
- Fouchier, L. et C. de. A travers la Calabre, 227*
- Fowke, G. Antiquities of Central and S. E. Missouri, 474*; Map of Archaeological Sites in Missouri, 158*
- Fox, Dr. R. Oberflächengestaltung des norddeutschen Flachlandes nach Wahnschaffe, 558*
- Föyn, N. J. Klima von Bergen, 316*
- France: ¶Cathedrals of Northern —. T. F. Bumpus, *n.*, 702; Dérivations glaciaires de cours d'eau . . . et le Jura français. Prof. H. Schardt, 71*; Les Dunes continentales de Moret-sur-Loing, front oriental de la forêt de Fontainebleau. C. Duffart et F. Bergeron, 718*; Étude du profil en long des cours d'eau français. E. de Margerie, 71*; Expansion de la langue française dans le monde. J. de Novicov, 479*; Glaciations des Alpes françaises. J. Révil, 477*; Greenwich Time Adopted in, 289; Landeskunde von Frankreich. Dr. R. Neuse, *n.*, 383; Sur la morphologie de la partie médiane et orientale du Massif Central. A. Briquet, 718*; Nivellement général . . . progrès de 1899 à 1908. Ch. Lallemand, 71* La pluie en France en 1910. L. Rudaux, 638*; Progrès récents de la topographie et géodésie de haute montagne en. H. Vallot, 73*; Régions et Pays de France. J. Fèvre et H. Hauser, *n.*, 539; Schneegrenze in den französischen Alpen. Dr. V. Paschinger, 793*; Picturesque Tour through France, Switzerland, etc., in 1816. [Joseph Mawman], 238* ¶Travels in — 1818. Lieut. F. Hall, 320*; Variations périodiques des glaciers. 1909. Alpes françaises et Pyrénées. C. Rabot, 558*; Über Wüstenbildungen in der Chelléen-Interglaciale von Frankreich. P. Sarasin, 226*
- ¶Economic: Coal Basin of Decazeville. J. J. Stevenson, 793*; Études sur les Gisements de Mollusques comestibles des Côtes de France. L. Joubin, 315*; Notes prélim. sur les

- Gisements de Mollusques comestibles des Côtes de France. J. Guérin-Ganivet, 226*, 638*; Grands Ports de France, leur Rôle économique. P. de Rousiers, *rev.*, 702; Limite septentrionale de l'olivier dans les Alpes françaises. R. Blanchard, 558*; Northern Limit of the Olive, etc. (*rev.*), 397*; Notre Territoire agricole, 871*; Les ouvriers du coton dans la région de Rouen. J. Levainville, 558*; Ressources de la France en minerais de fer. P. Lemoine, 477*; Wasserkräfte Frankreichs. W. Wohlrabe, 71*; La France et ses Colonies. H. Busson, J. Fèvre et H. Hauser, *n.*, 148
- ¶ Maps of France: Carte au 50,000^e dérivée des levés à grande Échelle, *n.*, 551; Carte aéronautique: Feuille Châlons, *n.*, 878; Carte des Gisements de Coquilles comestibles de la Côte du Finistère. J. Guérin-Ganivet, 392*, — de la rade de Brest, etc. J. Guérin-Ganivet, 234*; Carte tectonique de la région charentaise; les différents cycles d'érosion de la région de la Charente, *n.*, 710; Dessin-Modèle du rocher en haute montagne: le Cirque du Creux Noir, *n.*, 960; État d'avancement au point de vue cartographique des travaux de révision, *n.*, 551; Étude du profil en long des cours d'eau français. État d'avancement en 1910, 79*; Glaciers du Massif des Grandes Rousses, 392*; Goode's Base Map, *n.*, 712; Limite de la montagne dans le Limousin, 878*; Schéma orogr. hydrogr. du Massif des Grandes Rousses. Ch. Jacob, 393*; Schéma des extensions glaciaires les plus récentes dans le Massif des Grandes Rousses. Ch. Jacob, 393*
- France. Colonies. ¶ Commerce des colonies françaises, 639*; Statistiques du Commerce des colonies françaises pour 1908, 559*, 636*, 639*, 716*, 789*, 791*, 792*, 793*; Le coton dans les colonies françaises, 871*; Enseignement aux indigènes: Madagascar — Indo-Chine — Colonies britanniques, *n.*, 149; Statistiques de l'Industrie minière dans les colonies françaises, 1908, 639*, 791*, 792*, 793*, 868*, 870*; Statistiques de la Navigation dans les colonies françaises, 1909, 639*
- Franck, Dr. F., *joint author*, see Dr. E. Marckwald.
- Franck, H. A. Vagabond Journey Around the World, *rev.*, 216
- Franconia. Der Steigerwald: ein Beitrag zur Geographie Frankens, *rev.*, J. Schwender, 679
- Frank, Dr. L. Beziehungen zwischen Regenfall u. Quellergiebigkeit, unter besonderer Berücksichtigung Münchener Wasserversorgung und der Kissinger Quellen, 871*
- Fraser, Sir Andrew H. L. Among Indian Rajahs and Ryots, *n.*, 538
- Fraser, J. F. Australia: The Making of a Nation, *rev.*, 379
- Frech, Prof. Dr. F. Über die geologische Entwicklung Chinas, 156*
- Free, E. E. Movement of Soil Material by the Wind, 953*; See also S. C. Stuntz, *joint author*.
- Freer, P. C. The Study of Manila Copal, 225*
- Freeston, C. L. High-Roads of the Alps, *rev.*, 381, 934
- Freitas, J. A. de. O 2^o Visconde de Santares e os seus Atlas Geographicos, *n.*, 215
- French Equatorial Africa. See under Africa; — Guiana: See under Guiana; — Guinea. See under Guinea; — India. See under India; — West Africa: See under Africa.
- French Language: Expansion de la langue française dans le monde. J. de Novicov, 479*
- Frers, E. Resultados obtenidos en el Segundo Congreso Internacional del Frio, 873*
- Freytag's Automobile- und Radfahrer-Karten, Brünn; Südtirol und Oberitalien, 79*; —Automobil-Routenkarte von Mittel-Europa, 79*
- Fribourg. ¶ Études de géographie physique sur le canton de —, 952*; — et son site géographique. Étude de géographie urbaine. Prof. P. Girardin, 559* ¶ Maps of Fribourg: Maps accompanying "Coudes de Capture" du pays fribourgeois. G. Michel, 959*; Maps illustrating "Les Cirques de Montagne" (Alpes fribourgeoises, etc.), M. Koncza, 959*
- Friederici, Dr. G. In das Hinterland der Nordküste der Kaiser Wilhelmslandes, 156*
- Friedländer, Dr. E., Project of International Institute of Vulcanology in Naples, 60
- Fritsche, Dr. H. Die saecularen Aenderungen der Erdmagnetischen Elemente, 317*
- Froidevaux, H. Œuvre de la Mission hydrographique du Maroc, 790*
- Früh, Dr. J. Einbruch des Lötschberg-tunnels unter dem Gasterntal, 71*

- Frye, T. C. Height and Dominance of Douglas Fir, 221*
- Fryer, J. C. F. South-West Indian Ocean (Account of Aldabra and certain Neighboring Islands . . . not explored by Prof. J. S. Gardiner), 316*
- Fuller, M. L., *joint author*, see C. W. Hall.
- Furness, A. W. A Man of War in the East Indies, *n.*, 219
- Furniss, H. W. Developments in Haiti, 475*
- Fur Seal Treaty, 622
- Fürst, Carl M. Notes on Anthropological Problems and Their Social Applications, 479*
- Fynn, Dr. E., Jr. The Dairy Industry in Argentine Republic, 314*
- G.
- Gagnon, E. Louis Jolliet, découvreur du Missisipi, etc., 318*
- Galapagos Islands. G. Fortescue, 557*
- Galdieri, A. Terrazze orografiche dell' alto Piceantino a nord-est di Salerno, 603
- Gale, H. S. Coal Fields of N. W. Colorado and N. E. Utah, 313*; Phosphates in Montana, 313*; —, R. W. Richards and E. Blackwelder. Phosphates, 221*; — and C. H. Wegemann. Buffalo Coal Field, Wyo., 313*
- Galilee, Studies in. E. W. G. Masterman, *rev.*, 209
- Gallois, E. Sur la crue de la Seine de Janvier 1910, 718*; L'olivier et le palmier en Tunisie, 69*
- Galveston Bay and — Entrance, Charts U. S. Coast and Geod. Surv., 157*
- Gambia, Agricultural Labour Conditions in. Dr. E. Hopkinson, 556*
- Gäng, P. M. Die Pest in Ost-Shantung, 792*
- Ganges, Historical Map: Fac-similé de la Figure III de la *Carte générale* du cours du Gange et du Gagra . . . 1784; Fac-similé de la Figure VI de la *Carte générale*, (Fausse Source du Gange), 879*
- Gannett, H. Population of the United States, 394*; United States, Relief Map, *n.*, 76
- García, G. Dos Antiguas Relaciones de la Florida, 480*; Carácter de la Conquista Española en América y en México, etc., 480*; Historia Verdadera de la Conquista de la Nueva España por Bernal Diaz del Castillo . . . única edicion, etc., 480*; Juarez, Refutacion a Don Francisco Bulnes por —, 480*; —, *Editor*. Mexico durante su guerra con los Estados Unidos. Documentos inéditos . . . Don Juan de Palafox y Mendoza, 480*; Tumultos y Rebeliones Acæcidos en México. Documentos inéditos pub. por —, 480*; Su virreinato en la Nueva España, etc. Don J. de Palafox y Mendoza, 480*
- Gard, Recherches spéléologiques dans le Department du. 1904-9. F. Mazauric, 315*
- Gardner, J. H. Carthage Coal Field, N. M., 313*; Coal Field between San Mateo and Cuba, N. M., 313*; Isolated Coal Fields in Santa Fé and San Miguel Cos., N. M., 151*
- Garos, The. Maj. A. Playfair, *n.*, 65
- Garwood, Prof. E. J. Features of Alpine Scenery due to Glacial Protection, 315*; Glacial Erosion, 202
- Gautier, Contessa. The Streets of Rome, 793*
- Gautier, E. F. La Conquête du Sahara. Essai de psychologie politique, *rev.*, 695; Sahara algérien, *rev.*, 140
- Gavelin, A. Carte de la Laponie suédoise indiquant la distribution des gisements de pin sylvestre et de bouleau subfossiles, 551*
- Gazaland: Through Gasa Land and the Scene of Portuguese Aggression. P. Gillmore, 319*
- Geer, G. de. Das Spätglaciale Süd-Schweden. Übersichtskarte mit Osen, Endmoränen und Schrammen (Swedish Geol. Surv.), *n.*, 711
- Geer, S. de. Karte öfver Mellersta Sveriges Landformer af, 711*
- Geerligs, H. C. Prinsen. Rietsuiker-industrie van productie. Brazilië, 222*
- Geil, W. E. Lecture on Land of the Great Wall, 132
- Geistbeck, A. Erdkundlicher Unterricht und staatsbürgerliche Erziehung, 640*
- Genève à Milan, Lettres sur la Route de — par le Simplon écrites en 1809. G. Mallet, 10^{me} éd., 238*
- Gennerich, E. Die Flüsse Deutschlands, *n.*, 934
- Genoa, Map: Genova, *n.*, 311
- Genthe, M. K. Geography in Germany and the U. S., 291
- Gentil, L. Amalat d'Oujda. Étude de géographie physique, 790*; Une leçon de géographie physique sur le Maroc, 476*
- Geodesy, Progress in. A. R. Hinks, 530
- Geographen-Kalender, 1911, *rev.*, 467
- Geographic Nomenclature: ¶ Decisions of U. S. Geographic Board, 66, 394, 475, 635, 715, 789, 867, 949*; Revision of previous Decisions, 635,

- 715*; ¶ Geographic Board of Canada, Decisions, 66, 394, 554, 635, 715, 949*; Origin of Geographic Names. A. W. Farnham, 318*; Regional Peculiarities in Place Names. R. H. Whitbeck, 273
- Geographical Association, Students' —, 451
- Geographical Atlases, List of — in the Library of Congress, *rev.*, 312
- Geographical Bibliography: Bibliotheca Geographica, Jahresbib. geogr. Literatur. Dr. O. Baschin, *n.*, 150
- Geographical Biology: See Biogeography.
- Geographical Congresses: Il VII Congresso Geog. Italiano, 478*; *Compte Rendu des Travaux du Congrès. Neuvi. Congrès Intern. de Géog. A. de Claparède*, Vol. I, 74*; III, 873*; French Geog. Congress, 203; Tenth Intern. Geog. Congress postponed, 922
- Geographical Equipment of the Cleveland Normal School. W. M. Gregory, 453
- Geographical Excursion from Wales to Italy, 919
- Geographical Explorations: Geographische Forschungsreisen und ihre Ziele. Dr. B. Bruhns, *rev.*, 215
- Geographical Literature and Maps. Accessions to the Library, 61, 139, 205, 295, 373, 455, 531, 625, 693, 781, 863, 923
- Geographical Papers, Current:
- North America, 66, 151, 221, 313, 394, 474, 553, 635, 714, 788, 867, 947
 - Central America and West Indies, 67, 152, 475, 554, 636, 789, 868, 949
 - South America, 67, 152, 222, 314, 395, 475, 555, 636, 715, 790, 868, 949
 - Africa, 67, 153, 223, 314, 395, 476, 555, 636, 715, 790, 869, 950
 - Asia, 70, 155, 224, 315, 396, 477, 556, 636, 717, 791, 870, 951
 - Australasia and Oceania, 70, 156, 225, 397, 477, 557, 638, 718, 792, 871, 952
 - Europe, 70, 157, 226, 315, 397, 477, 558, 638, 718, 792, 871, 952
 - Polar Regions, 72, 227, 398, 478, 559, 639, 719, 794, 872, 952
 - Islands of the Atlantic, 316, 872 — of the Indian Ocean, 316, — of the Pacific Ocean, 228
 - Anthropogeography, 316, 559
 - Anthropology, 72, 398, 479
 - Cartography and Mathematical Geography, 72, 316, 399, 639, 953
 - Economic Geography, 72, 317, 399, 479, 559, 639, 719, 794, 872, 952
 - Educational, 72, 399, 640
 - Historical Geography, 559, 640
 - Ontography, 399, 872
 - Physical Geography, 73, 228, 317, 399, 479, 560, 640, 720, 794, 872, 953
 - General, 74, 228, 318, 399, 479, 640, 794, 872, 953
 - Geographical Record, 51, 130, 195, 283, 365, 447, 518, 618, 685, 775, 854, 916
 - Geographical Societies. Maj. L. Darwin, 779
 - Geographical Society of Chicago, Excursions of, 922
 - Geograph.-ethnographische Gesellschaft in Zurich, *Jahresbericht*, 1909-10, 316*
 - Geographisches Jahrbuch, for 1910. Dr. H. Wagner *et al*, 560*, *n.*, 705
 - Geography: ¶ Erdkundlicher Unterricht und staatsbürgerlicher Erziehung. A. Geistbeck, 640*; Fascination of Geography. K. Qualtrough, 794*; Geographical Descriptions as Reflections of Preparatory Equipment. W. M. Davis, 847; *Geographie auf der Naturforscherversammlung*, F. Hahn, 794*; Geographische Seminar in Göttingen. E. Harms and O. Kämpfer, 72*; Guide to Geographical Books and Appliances. *n.*, H. R. Mill, 942; Idee zur Einrichtung eines "Geographiesaales" in mehrklassigen Schulen. A. Fetz, 72*; Geography in Germany and the U. S. M. K. Genthe, 291; Modern Geography. M. I. Newbigin, *rev.*, 942; Nations of the World. Elementary Study in Geography. H. J. Mackinder, *n.*, 543; Pflege der Geographie an der Berliner Universität im ersten Jahrhundert ihres Bestehens. Dr. H. Wagner, 316*; Purpose and Position of. Col. C. F. Close, 740; Reformvorschläge des Deutschen Geographentages für den erdkundlichen Unterricht an den höheren Schulen, 952*; Riforme urgenti per la geografia nelle Università Italiane. G. Dalla Vedova, C. Bertacchi and others, 952*
 - Anthropogeography: Fribourg et son site géographique. Étude de Géographie urbaine. P. Girardin, 559*; Géographie humaine. Essai de classification. J. Brunhes, *rev.*, 467; Geographic Influences in American Slavery. F. V. Emerson, 13, 106, 170; Influences of Geographic Environment on the Basis of Ratzel's System of Anthro-Geography. E. C. Semple, *rev.*, 937
 - Biogeography, Shackleton's contribution to. C. H. T. Townsend, 479*
 - Colonial Geography: Dr. H. Meyer's

donation for professorship of Colonial Geography, 60; Wesen und Aufgaben der kolonialen Geographie. Dr. F. Jaeger, 953*

Comparative Geography: Statistique annuelle de Géographie comparée. J. Birot, *rev.*, 466

Economic Geography: Causes of Increased Cost of Agricultural Staples. E. D. Jones, 399*; Some Factors influencing the Location and Migration of Industries. Prof. W. S. Tower, 639*; Geographie und Verkehrswissenschaft. Dr. R. Hennig, 794*; Géographie des textiles. P. Clerget, 479*; Medizinische Geographie. Prof. Dr. Dove, 794*; Spécialisation des Jardins botaniques dans les recherches d'agriculture tropicale. Dr. G. Capus, 479*; Trade Routes. Past and Present — East and West. R. Kalisch, 399*

Historical Geography: August Petermann: Ein Beitrag zur Geschichte der geographischen Entdeckungen und der Kartographie im 19. Jahrhundert. Dr. E. Weller, *rev.*, 845; Claudius Clavus and the Early Geography of the North. E. Heawood, 228*; Le commerce de l'ancienne Égypte avec les nations voisines. Prof. E. Naville, 869*; Epoca delle grandi Scoperte geografiche. C. Errera, *n.*, 787; Establishment of Michigan's Boundaries: A Study in Historical Geography, 339; Report of Conference on the Relations of Geography to History. E. E. Sparks, 317*; Syndicat de Navigation à Périgueux pour la rivière de l'Isle en 1520. F. Villepelet, 719*

Mathematical Geography: Unterricht in der mathematischen und astronomischen Geographie nach Umfang und Methode. A. Müller, 318*

Physical Geography: Cosmos: Sketch of Physical Description of the Universe. A. von Humboldt, 320*

Political Geography: Zur Geographie der politischen Grenzen. Dr. H. Walser, 318*; Politische Wirtschaftsgeographie. A. Dix, 317*

School Geography: Commercial Geography. A. P. Brigham, *rev.*, 940; Commercial Geography. E. Van Dyke Robinson, *rev.*, 384; Highroads of Geography. Royal School Series, *rev.*, 941; Industrial and Commercial Geography. C. Morris, *rev.*, 385; Lehrbuch der Erdkunde für höhere Schulen. A. Steinhauß und Dr. M. G. Schmidt, *n.*, 219; Manual of Physical Geography. Dr. F. V. Emerson, 453;

Oxford Geographies. Vol. III. Senior Geography. A. J. Herbertson, *n.*, 149; Physical Geography. Purpose of the Course-Training for Service. Prof. C. Cobb, 479*; Physiographical Introduction to Geography. A. J. Herbertson, *n.*, 219; Present Problems in Elementary School Geography. W. M. Gregory, 452

Zoogeography: ¶ Distribution géographique des races antiques parmi les animaux domestiques. Dr. C. Keller, 74* ¶ Maps accompanying "Zoogeography" (*rev.* Bartholomew's Atlas of), 959*

Geologen-Kalender, 1911-12, *rev.*, 786
Geologic Work of Ants. Prof. J. C. Branner, 293

Geological International Congress at Stockholm, 227*; Spitzbergen Excursion of. Prof. R. S. Tarr, 31

Geological Society of South Africa, *Proceedings* for 1910, 637*

Geology: ¶ Climates of Geological Past. H. J. Jensen, 317*; Economic Geology. With special Reference to the U. S. H. Ries, *rev.*, 219; Elements of Geology. E. Blackwelder and H. H. Barrows, *rev.*, 939; Geologische Charakterbilder. Herausgegeben von Dr. H. Stille, Heft 2, und 3, *n.*, 215; Lehrbuch der Geologie. Dr. E. Kayser, *rev.*, 307; Outlines of Geologic History, with Special Reference to North America, *rev.*, 297; ¶ Aeolian Geology: Bibliography of. S. C. Stuntz and E. E. Free, 953*; Movement of Soil Material by the Wind. E. E. Free, 953* ¶ Map of Portion of Land Hemisphere showing Paleozoic land connections and paths of marine faunal migrations, 959*

Geomorphology: ¶ Notes on the Description of Land Forms. Prof. W. M. Davis, 46, 190, 598, 679, 847; Place of Deduction in Description of Land Forms. W. M. Davis, 598; Repeating Patterns in the Relief and in the Structure of the Land. W. H. Hobbs, 719*; Terminologie der Oberflächenformen. A. Hettner, 640*

Georgia: ¶ Preliminary Report on Drainage Reclamation in. S. W. McCallie, 880*; Results of Spirit Levelling, etc. R. B. Marshall, 313*; Wire-Grass Country of Southern —. R. M. Harper, 522 * ¶ Maps of Georgia: Ellijay Quadr., 389*; Map to Show Distribution of Granites and Granite Quarries, 76*; Map showing production of Cotton in 1909, 229*; Soil Survey Map of Franklin Co.,

77*; — of Pike Co., 229*; Chart U. S. Coast and Geod. Surv.: Georgia from Hunting Island to Ossabaw Island, 76*

Georgian Bay: Rapport de l'exploration à la Baie Georgienne. C. Legge, 560*

Georlette, F. A. La métamorphose de la capitale du Brésil, 790*

Gerland, Dr. G. Seismische Verhalten des Atlantischen und des Pazifischen Ozeans, 73*

German Asiatic Society: *Asien*, 137

German Colonies: Deutsch-koloniale Baumwoll-Unternehmungen. K. Supf, 398*; 871*; Deutsche Kolonialschule in Witzenhausen. Dr. M. G. Schmidt, 952*; Drahtlose Telegraphie und die deutschen Kolonien, 793*; Ergebnisse der Regenmessungen im Jahre 1909, 557*; Förderung der Wollschafzucht in den deutschen Kolonien, 478*; Fortschritte der deutschen Kolonial-Kartographie in den Jahren 1905-10. P. Sprigade und M. Moisel, 316*; Kautschuk-Plantagenbau in seiner Bedeutung und seinen Gefahren für die deutsche Kolonialwirtschaft. Dr. E. Marckwald und Dr. F. Frank, 639*; Kurze Charakteristik des Klimas der deutschen Schutzgebiete. H. Maurer, 639*; Land-u.-Forstwirtschaftlichen Versuchstationen der deutschen Kolonien. A. Engler and G. Volkens, 478*; Dr. H. Meyer's Donation for professorship of Colonial Geography, 60; Les possessions allemandes dans la mer du Sud. L. Nemry, 557*; Ueber das Schulwesen unserer Schutzgebiete. Dr. C. G. Barth, 639*; Viehzucht in den deutschen Kolonien. Dr. Schilling, 227*; Wirtschaftlichen Fortschritte in unseren afrikanischen Kolonien. Maj. W. Langheld, 797*

German East Africa, see under Africa. — German New Guinea. See under New Guinea and Kaiser Wilhelms Land. German Southwest Africa. See under Africa.

Germany: ¶ Beiträge zur Bevölkerungs- und Siedelungsgeographie Deutschlands. Dr. O. Schlütter, 227*; Colonial Education in. L. Hamilton, 398; Completion of the Map of German Empire in 1:100,000, 450; Eisverhältnisse an den deutschen Küsten im Winter 1910/11, 952*; Die Flüsse Deutschlands. E. Gennerich, n., 934; Geographical Instruction in German Elementary Schools. A. Jahr, 639*;

Reformvorschläge . . . für den erdkundlichen Unterricht an den höheren Schulen, 952*; Grosse erratische Blöcke im norddeutschen Flachlande. (Geol. Charakterbilder). Dr. F. Wahnschaffe, n., 215; Grosstädte des Deutschen Reichs. H. Wichmann, 398*; Jahrbuch der k. k. geol. Reichsanstalt, 1910, 316*; Man and his Environment in. R. S. Tarr, 227*; Mineral Production of Germany in 1910, 952*; Oberflächengestaltung des Norddeutschen Flachlandes. Dr. F. Wahnschaffe, rev., 212; — nach Wahnschaffe. Dr. R. Fox, 558*; Neuere ozeanographische Arbeiten der Deutschen Marine, insbesondere der Seewarte. Dr. G. Schott, 74*; Population of Germany, 1910, 370; Situation économique. G. Blondel, 226*; Spuren der Eiszeiten in Norddeutschland und Versuch ihrer Deutung. H. Habenicht, 71*; Studien über Nordostdeutsche Inlanddünen. Dr. F. Solger, n., 144; Tabellarische Reiseberichte nach meteorologischen Schiffstagebüchern, 74*; Die Winde in Deutschland. Dr. K. Knoch, 793*; Wüstenformen in Deutschland? Dr. A. Hettner, 315* ¶ Maps of Germany: Geol. Karte des Dammersfeldes in der Rhön und seine südwestlichen Umgebung. O. Drehe, 958*; Geol. Übersichtskarte Nordwestdeutschlands, 878*; German School Wall Maps, n., 235; Goode's Base Map, n., 712; Isochronenkarte des Gesamtverkehrs für Mitteldeutschland mit dem Ausgangspunkt Leipzig; Isochronenkarte des Gesamtverkehrs für die weitere Umgebung von Leipzig, 711*; Körper-Geographie: Abweichung der altsächsischen Hausgrenze von niederdeutschen und niedersächsischen Sprachgrenze, 878*; Nordwestdeutschland, Sprach-Geog.; Sach-Geog., 878*; Map showing glacial geology of region between Elbe and Lübeck, 958*; Nordwestdeutschland. Versuch einer Karte der verschiedenen Orten des Fensteröffnens, n., 878; Overzichtskaart van de tot heden bekende Veenbruggen in Nederland en N. W. Duitschland, 959*; Verbreitung der Salzflora in Anhalt, Provinz-Sachsen und Mark Brandenburg, 958*; Sturmflut . . . an der Küste Pommerns. Dr. G. Krüger, 710*; Verkehrsgeographische Bedeutung der Deutschen Reichsgrenze, 958*

Gerste, A. Notes sur la Médecine et la

- Botanique des anciens Mexicains, 395*
- Giacchi, G. Bosnia-Erzegovina sotto l'aspetto storico, etc., 157*
- Giannitrapani, Capt. L. Grandi Comunicazioni di Terre e di Mare, *n.*, 946
- Gibson, C. G. Geol. Sketch Map of Country along Route of Proposed Trans-Continental R.R. (Australia), *n.*, 311
- Gibson, H. Evolution of Live-Stock Breeding in Argentina, 314*
- Gilbert, Dr. Grove K., Award of Daly Medal to, 51
- Gilbert Islands: Die heutige Lage der Gilbert-Insulaner, 228*; — and Ellice Islands, 397*
- Gill, T. Biographical Sketch of Col. William Light, the First Surveyor-General of Australia, 718*
- Gillmore, P. Through Gasa Land, and the Scene of Portuguese Aggression, 319*
- Gilly, W. S. Narrative of an Excursion to the Mountains of Piemont . . . Researches among the Vaudois, etc., 238*
- Girardin, Prof. P. Fribourg et son site géographique. Étude de Géographie urbaine, 559*; Rôle des conditions topographiques dans le développement des villes suisses, 871*
- Girola, C. D. Cultivation of Plants for Industrial Purposes in Argentina, 314*
- Gironcourt, G. de. Mission en Afrique Occidentale, 950*
- Givenchy, C. de. Évolution économique et sociale de la Tunisie, 869*
- Glaciation and Glaciers: ¶État actuel des études glaciaires. Prof. P. L. Mercanton, 74*; Characteristics of Existing Glaciers. W. H. Hobbs, *rev.*, 934; Über die Entstehung der Eisberge. M. C. Engell, 399*; Glacial Erosion. Prof. E. J. Garwood, 202, Certain Phases of —. T. C. and R. T. Chamberlin, 720* Glazialer Karree-oder Polygonenboden. Dr. W. Ule, 872*; Glacial Theory. [The Duke of] Argyll, 239*; Theory of Advance of Glaciers in response to Earthquake shaking. R. S. Tarr, 399*; Pleistocene Glaciation and Coral Reef Problem. R. A. Daly, 399*; Pleistozäne Hebungen und Vergletscherung. Prof. J. Cvijić, 73*; "Rock Glaciers" or Chrysocrenes. J. B. Tyrrell, 318*; ¶Reports on Recent Glacier movements: — Bericht der internat. Gletscherkommission für 1907-10. Dr. Ed. Brückner, 794*; Revue de Glaciologie. C. Rabot, 317* Variations of Glaciers. H. F. Reid, 318*; Variations périodiques des glaciers. XV^{me} Rapport, 1909. Dr. Ed. Brückner and E. Muret, Editors, 794*; Variations périodiques des glaciers, 1909. Alpes françaises et Pyrénées. C. Rabot, 558*; Alpes italiennes. Prof. O. Marinelli, 478*; Alpes orientales. Dr. Ed. Brückner, 477*; États-Unis. H. F. Reid, 635*; Norvège. P. A. Øyen, 559*; Russie. J. de Schokalsky, 559*; Suède. Dr. A. Hamberg, 559* ¶Regional Studies of Glaciation: Comparison of North American and European Glacial Deposits. F. Leverett, 201; Pleistocene Glaciation of North America viewed in the Light of Our Knowledge of Existing Continental Glaciers. W. H. Hobbs, 641; Glacial Advance in Alaska and Earthquakes. Prof. R. S. Tarr, 285; Glacial Studies in Alaska, 448; Glaciers of the West Coast of Prince William Sound and the Southern part of Kenai Peninsula. U. S. Grant and D. F. Higgins, 321, 401, 721; Extension of the Known Area of Pleistocene Glaciation to the Coast Ranges of California. R. S. Holway, 161; Terminal Moraine of the Puget Sound Glacier. J. H. Bretz, 714* Glacial Geology in St. Louis and Vicinity, Studies in. J. A. Drushel, 867*; Tongue of the Hasanabad Glacier in 1908. W. H. Workman, 225*; Kumdan Glaciers in 1902. Dr. S. Hedin, 225*; Notes on Certain Glaciers in Sikkim. T. H. D. LaTouche, 225*; Anciens glaciers de la Corse et les oscillations pleistocènes de la Méditerranée. R. Lucerna, 560*; Études récentes sur les glaciers du Dauphiné. C. Jacob, 73*; Sur la dernière période glaciaire en Europe et dans l'Amérique du Nord en rapport . . . cause de périodes glaciaires en général. N. J. Kriscfafowitsch, 317*; Some Effects of Glacial Action in Iceland. F. E. Wright, 478*; Glazialgeologische Studien über die rezenten und diluvialen Gletschergebiete Islands. H. Reck, 793*; Gletscherbeobachtungen in Selrain und nördlichen Stubai 1909. Dr. M. Lagally, 477* ¶Maps of Glaciers: Glaciers du Massif des Grandes Rousses, 392*; Schéma des extensions glaciaires les plus récentes. C. Jacob, 393*; Kames of Maine and S. E. New Hampshire, 954*; Maps showing glaciated areas in North America and Europe, 959*;

- Glacial Geology of the region between the Elbe and Lübeck, 958*;
 Glacial Geology of the U. S. and Canada, *n.*, 954; Glacial Lake Agassiz showing its relation to Hudson Bay and the Great Lakes, 954*; Stages of recession of ice in Minnesota, 954*; Western New York showing distribution of morainal deposits, 954*; Sketch Map of Missouri Coteau and its Moraines. J. E. Todd, 955*; Übersichtskarte der Gletschergebiete von Island. H. Reck, 711*
 Glacier National Park, 366
 Glangeaud, Ph. Migration de la ligne de partage des eaux dans la chaîne des Puys, 638*
 Glenn, L. C. Denudation and Erosion in Southern Appalachian Region and Monongahela Basin, 635*
Globus merged with *Petermanns Mitteilungen*, 138
Glossina palpalis. See Tsetse Fly.
 Goblet, Y. M., *joint author*, see Dr. G. Samné.
 Goës, Dr. K. Die indischen Grossstädte, 717*
 Goethals, Col. G. W. Panama Canal, 790*
 Goffin, L. Chemins de fer nationaux vers le Katanga, 153*
 Gold, Certain Natural Associations of. F. C. Lincoln, 953*
 Gold Coast: ¶Beitrag zur Kenntnis des Klimas von Salaga, Togo und der Goldküste. G. A. Krause, 950*; Mapping the — and Ashanti. Maj. F. G. Guggisberg, 791* ¶Map of the Gold Coast and Ashanti, *n.*, 78
 Gold, E., and W. A. Harwood. Upper Air, 479*
 Goldenweiser, A. A. Totemism, an Analytical Study, 398*
 Goldman, M. I. Colorado Springs Coal Field, 151*
 Goldthwait, J. W. Instrumental Survey of Shorelines of the Extinct Lakes Algonquin and Nipissing in S. W. Ontario, 949*; Raised Beaches of Southern Quebec, 949*
 Golf, Dr. Ackerbau in Deutsch-Südwestafrika, 637*
 Goodchild, T. Northeastern Cheh-kiang, China: Notes on Human Adaptation to Environment, 801
 Goode, J. P., Base Maps, *n.*, 712
 Gordon, C. E. Geology of Poughkeepsie Quad., 867*
 Gordon-Cumming, C. F. Via Cornwall to Egypt, 400*
 Görgény Mountains, Map of Part of, 958*; Geol. Kartenskizze der Mezö-havas Masse, 958*
 Gosiute Indians, Ethno-Botany of. R. V. Chamberlin, 788*, 867*
 Gottfried, J. L. Historische Kronyck. Grootlycks vermeerderd en Verbetert (1702), 720*
 Göttingen, Das geographische Seminar in. E. Harms and O. Kämpfer, 72*
 Götz, Prof. Wilhelm, *Obituary*, 529
 Götzen, Count Adolph von, *Obituary*, 59
 Göttinger, Dr. G. Bergstürze des Mai 1910 in der Umgebung von Scheibbs, 711*; Hafen von Mannheim, 871*
 Gould, C. N. Progress Geol. Map of Oklahoma, 796*
 Gouillet, Col. Organisation militaire de l'Afrique Équatoriale, 395*
 Gouraud, Col. Pacification de la Mauritanie, 69*
 Goyaz, Lo Stato di. E. Axerio, 715*
 Gradmann, R. Getreidebau im deutschen und römischen Altertum, *n.*, 148
 Gräf, Dr. Biologie. Forschungsreise S. M. S. Planet, 1906-7, *n.*, 212
 Graians, Scrambles in the Eastern. G. Yeld, 320*
 Gran Chaco: Gran-Chako und die Pampas. W. Simon, 67*
 Grand Canyon of the Colorado: ¶History of — District. Prof. D. W. Johnson, 285; Single Cycle Development of — H. H. Robinson, 948*
 Grande, Rio — do Sul, Navegação na costa do. A. Alves Dos Santos, 715*
 Grant, M. Conditions of Wild Life in Alaska, 714*
 Grant, U. S. Mining and Prospecting on Prince William Sound, 1909, 151*; — and D. F. Higgins. Glaciers of Prince William Sound and the Southern Part of the Kenai Peninsula, Alaska, 321, 401, 721; Prel. Report on Mineral Resources of Southern Part of Kenai Peninsula, 151*
 Grasset, Capt. Journal du corps de débarquement de Casablanca à travers la Chaouïa, 869*
 Gravier, G. Émancipation économique de la Serbie, 952*
 Gravity Determinations at Sea. L. A. Bauer, 399*
 Gray, C. J. Report of Mining Industry of Natal, 1909, 396*
 Gray's Harbor, Wash., Chart U. S. Coast and Geod. Surv., 76*
 Gray, W., and A. L. Halden. Minería de estaño en Bolivia, 950*
 Grayson Co., Tex., Soil Survey Map of, 158*

- Great Basin, Surface Water Supply of — 1909. E. C. La Rue and F. F. Henshaw, 635*
- Great Britain. See also United Kingdom, Ireland and Scotland: ¶Ancient Britain and the Invasion of Julius Cæsar. T. R. Holmes, *rev.*, 142; Early Britain. Roman Britain. E. Conybeare, *n.*, 701
- Great Lakes: ¶Fur-Trade on the Upper Lakes, 1778-1815, 314* History of. F. Leverett, 52; Our Inland Seas. Shipping, Commerce, etc. J. C. Mills, *rev.*, 139; Outline of the History of. F. Leverett, 553* ¶Maps of Great Lakes: Map showing Preglacial Drainage in the Basin of Lower —, 954*; Meteorological Charts U. S. Weather Bur., 158, 229, 389, 632*
- Great Plains in their Relation to Human Occupation and Development. C. W. Hotchkiss, 635*
- Greatorox, E. Landmarks of Old New York, 236*
- Greece: ¶Classical Dictionary of the Greeks and Romans with account of coins, weights and measures, etc. C. Anthon, 320*; Distribution of Early Civilization in northern. A. J. B. Wace and M. S. Thompson, 871*; Greek Lands and the Greek People. Prof. J. L. Myres, 558*; Griechen und Bulgaren im neunzehnten und zwanzigsten Jahrhundert. Prof. N. Kasasis, *n.*, 144; Histoire de la civilisation hellénique. M. C. Paparrigopoulos, 400*
- Greenfield, W. H. Sketch Map of East Central Queensland. Gold Mineral and Coal Fields, 311*
- Greenland: ¶Bemerkungen über die geographische Lage der Niederlassungen in Westgrönland. M. C. Engell, 72*; Census of Danish —, 689; Disappearance of Ancient Icelandic Colony of, 920; Expédition danoise de Mylius Erichsen à la côte nord-est du Groenland. Lieut. Trolle, 559*; Meddelelser om Grønland, (Communications on Greenland). Vols. XLIII and XLVII, 560*; Terrestrial Mammals and Birds of Northeast —. A. L. V. Manniche, 59 ¶Maps of Greenland: Carte indiquant la position de l'Isthme unissant l'île Clavering au Continent (Côte orientale du Grönland), 712*; Nördliches Westgrönland, Südliches Westgrönland. M. C. Engell, 80*
- Greenland Sea, Oceanography of. D. Damas, 479*
- Green River Basin, Wyo., Weathering of Coal in Arid Region of. A. R. Schultz, 151*
- Greenwich Time Adopted in France, 289; Rapport sur la question du Méridien de — spécialement . . . au point de vue de la France. E. Nicolle, 73*
- Gregory, E. W., *joint author*, see H. P. Maskell.
- Gregory, H. E. San Juan Oil Field, Utah, 474*; Personal, 623; — and H. H. Robinson. Prel. Geol. Map of Connecticut, 954*; See also M. R. Campbell, *joint author*.
- Gregory, J. W. Terms "Denudation," "Erosion," "Corrosion," and "Corrasion," 399*
- Gregory, W. M. Geographical Equipment of the Cleveland Normal School, 453; Map Study in Schools, 452
- Grenard, F. Tibet, the Country and Its Inhabitants, 237*
- Grenfell, Dr. W. T. Labrador, 789*; Land of Eternal Warring, 222*; Personal, 294
- Grimshaw, B. The New New Guinea, *rev.*, 381
- Grinnell, G. B. Great Mysteries of the Cheyenne, 553*; See also J. Burroughs, *joint author*.
- Grinnell Land. Remarks on English Maps of Arctic Discoveries in 1850-51, etc. P. Force, 400*
- Gröber, P. Carbon und Carbonfossilien des nördlichen und zentralen Tianschan, *n.*, 66
- Groll, Dr. M. Unterseeische Gebirge, 640*
- Grothe, Dr. H. Geographische Charakterbilder aus der asiatischen Türkei und dem südlichen mesopot.-iranischen Randgebirge, *n.*, 65; Meine Expedition durch Vorder-Asien, 870*
- Grouner (G. S.). Histoire naturelle des glaciers de Suisse, traduction libre de l'allemand par M. de Kéralto (1770), 238*
- Grover, N. C., and R. H. Bolster. Hydrography of Virginia, 880*
- Grubauer, A. Gunung Si-Bajak, 638*
- Grubb, W. B. Unknown People in an Unknown Land. Account of Life and Customs of Lengua Indians of Paraguayan Chaco, etc., *rev.*, 458
- Grube, W. Religion und Kultur der Chinesen, *rev.*, 931
- Grund, Dr. A. Zur Frage des Grundwassers im Karst, 157*; Die italienisch-österreichische Erforschung des Adriatischen Meeres, 718*; Das Karstphänomen (Geol. Charakterbilder), *rev.*, 215
- Gruvel, Dr. A. Der Fischfang der

- Eingeborenen den Kolonien Westafrikas, 791*; Les pêcheries de la Côte d'Ivoire, 716*
- Grytriken (Süd-Georgien). [Whaling Station], 872*
- Guadeloupe: Statistique du Commerce . . . 1908, 789*
- Guagira, Peninsula de la (Map). F. A. A. Simons, 955*
- Guaira, La: Ferrocarril de — a Caracas. J. Flind, 636*; La Guaira the Picturesque. I. A. Manning, 153*; Plano para el Estudio de la Desviación de la Plomada en, 876*
- Guam. Comm. G. L. Dyer, 558*
- Guatemala: ¶ Explorations in the Department of Peten. Tikal. T. Maler, 949*; Lakes of. E. F. Tisdell, 395*; Railroad Construction. E. F. Tisdell, 395*; Sculptures of Santa Lucia Cosumalwhuapa in —. S. Habel, 640*
- Gubbio, Past and Present. L. McCracken, 320*
- Guébriant, Mgr. de. Dans les rapides du Yalong (China), 70*
- Guérin-Ganivet, J. Notes préliminaires sur les Gisements de Mollusques comestibles des Côtes de France, 226*, 638*; Carte des Gisements de Coquilles comestibles de la Côte du Finistère, 392*, — del la Rade de Brest, 234*
- Gueudeville [Nicolas]. Atlas historique ou nouvelle Introduction à l'Histoire, etc., 720*
- Guggisberg, Maj. F. G. Mapping the Gold Coast and Ashanti, 791*
- Guiana, British: ¶ Balata and Rubber Industries, 476*; Cacao and Coffee, Coconut, Lime, Rice and Timber Industries, 555*; Foundation and Development of —. J. A. J. Villiers, 950*; Storm van's Gravesande. The Rise of British Guiana compiled from his Despatches by C. A. Harris and J. A. J. de Villiers, 318*; Sugar Industry, 476* ¶ Map to illustrate paper by J. A. J. de Villiers, 797*
- Dutch Guiana: ¶ Explorations of Lieut. E. de Haan in, 136; Gold-industry in Surinam. Dr. G. A. F. Molengraaf, 223*; Work of Exploration in, 525
- French Guiana: ¶ Statistique du Commerce . . . 1908, 790*; Statistiques de l'industrie minière . . . 1908. Tableau général de l'industrie minière de 1900 à 1908, 868*
- Guild, Hon. C., Jr. Present Forestry Issues, 394*
- Guinea, French: ¶ Achèvement du chemin de fer de la Guinée Française. Océan relié au Niger, 68*; Chemin de fer de la —. A. Arcin, 716*; Guinée Française: Chemin de fer et Progrès. E. Salles, 154*; Notes sur la —, 476*; Statistiques de commerce . . . 1908, 869* ¶ Maps of French Guinea: Carte du Pays Toma, 956*; Chemin de fer de Guinée et ses rapports économiques avec le Cours du Niger, 956*; Frontière Franco-Libérienne, 956*; Projet de délimitation en 1906 (between French Guinea and Liberia), 955*; Schéma des sources du Niger et du pays Toma, 955*
- Spanish Guinea: ¶ Guinea española. A. Barrera, 951*; Territorios Españoles del Muni. E. López Perea, 224*
- Guiterman, F. On the Use, Non-Use and Waste of Mineral Resources of Colorado, 221*
- Gulf Stream: Unperiodische Temperaturschwankungen im Golfstrom und deren Beziehung zu der Luftdruckverteilung. J. Petersen, 317* ¶ Map: Gulf Stream in the Gulf of Mexico showing Currents as they exist during Different Seasons. Lieut. J. C. Soley, Reverse Pilot Chart of North Atlantic Ocean, 632*
- Gulischambarov, S. Bevölkerung der Erde und ihre Verteilung nach dem Geschlecht, 559*
- Gunflint District, Ont. J. D. Trueman, 949*
- Gunung Si-Bajak [Sumatra]. A. Grubauer, 638*
- Guthe, Prof. Dr. Aufnahme des Ostjordanlandes durch den Deutschen Palästina Verein, 397*
- Gutiérrez de Santa Clara, P. Historia de las Guerras civiles del Perú (1544-1548), etc., n., 946
- Gutzlaff, C. Journal of Three Voyages along the Coast of China in 1831, 237*
- Guyer, G. A. Im Ballon über die Jungfrau nach Italien, n., 946


H.

- Haan, Lieut. E. Explorations in Dutch Guiana, 136
- Haanel, Dr. E. Possible Economies in Production of Minerals of Canada, 554*
- Haardt v. Hartenthurn, V. Hölzel's Wandkarte der Alpen auf Grundlage der Haardschen Karte. Dr. F. Heiderich, n., 79; —. Hand und Reisekarte der Alpen Länder, 234*
- Habel, S. Sculptures of Santa Lucia Cosumalwhuapa in Guatemala, 640*
- Habenicht, H. Spuren der Eiszeiten in

- Norddeutschland und Versuch ihrer Deutung, 71*
- Häberle, D. Der Pfälzerwald, 952*
- Haddon, A. C., and A. H. Quiggin. History of Anthropology, *rev.*, 543
- Hagen, Dr. B. Bericht über die von Dr. Elbert geführte Sundaexpedition, usw., 224*
- Hague, Dr. A. Origin of Thermal Waters in Yellowstone National Park, 553*
- Hahn, F. Geographie auf der Naturforscherversammlung, 794*
- Hahn, P. D. A Geyser in South Africa, 717*
- Haiti: ¶ Developments in. H. W. Furniss, 475*; En Haïti. Planteurs d'autrefois, Nègres d'aujourd'hui. E. Aubin, *rev.*, 300
- Hakluyt, Richard, Reproduction of Tablet erected in Bristol Cathedral to the Memory of, 800*
- Halbfass, Dr. W. Ergebnisse neuerer simultaner Temperaturmessungen in einigen tiefen Seen Europas, 317*; Zur Kenntnis der Seen der Hohen Tatra, 477*; Wirtschaftliche Bedeutung der Binnenseen, 399*
- Halden, A. L., *joint author*, see W. Gray.
- Hale, A. Balsam of Peru, 790*; Yerba Maté-Paraguayan Tea, 639*
- Hales, J. G. Survey of Boston and Vicinity . . . with Topographic Sketches of the Country, 560*
- Haliburton and Bancroft Areas, Geology of. F. D. Adams and A. E. Barlow, 66*
- Hall, A. D. Fertility of the Soil, 72*
- Hall, C. W., O. E. Meinzer and M. L. Fuller. Map of Southern Minnesota showing Underground Water Conditions, 706*; Map of S. Minn. showing thickness and Character of Surface Deposits, 706
- Hall, E. H. English Version of Prof. Bacchiani's Giovanni da Verrazzano and His Discoveries in North America . . . Cellere Codex of Rome, 221*
- Hall, Lieut. F. Travels in France in 1818, 320*
- Hall, R. Distribution of Australian Land-Birds, 871*
- Hall, T. S. Notes on Geology of the Country about Anglesea, 397*
- Halley's Comet: ¶ Address on the Return of — in 1910. A. C. D. Crommelin, 399*; Did the Tail of — affect the Earth's Atmosphere? Dr. J. Aitken, 228*; Return of. W. W. Campbell, 479*
- Hallock, C. Caves and Ruins of Arizona and Colorado, 394*
- Halmahera, Celebes en —. E. C. Abendanon, 224*
- Halot, l'île Formose, 225*
- Hamberg, Prof. Dr. A. Variations périodiques des glaciers, 1909. Suède, 559*
- Hamburg Geog. Society, German East Africa Expedition of the, 856
- Hamerton, Capt. A. E., *joint author*, see Col. Sir David Bruce.
- Hamilton, J. C. Prairie Province: Sketches of Travel from Lake Ontario to Lake Winnipeg, 400*
- Hamilton, L. Colonial Education in Germany, 398*; Cotton-Growing in German East Africa, 869*
- Hammond's Pocket Atlas of the World, *n.*, 880
- Hampton Roads, Va., Chart U. S. Coast and Geod. Surv., 875*
- Hamy, Dr. E. T. Voyage d'André Michaux en Syrie et en Perse (1782-1785), 870*
- Hanau, H. Drei Karten zur Ergänzung der Triaskarte. Slovakien, Galizien, Bukovina, usw., 233*; Königreich Böhmen und Erzherz. Böhmen-Eger, (Map), 233*; Triaskarte der Habsburger Monarchie, *n.*, 233
- Hanbury, D. T. Sport and Travel in the North land of Canada, 236*
- Hancock, J. L. Nature Sketches in Temperate America, *rev.*, 863
- Handel-Mazzetti, Dr. H. Frh. v. Reisebilder aus Mesopotamien und Kurdistan, 557*
- Hanging Valleys. See under Valleys.
- Hankow-Canton and Hankow-Sechuan Railways. Emprunt pour les chemins de fer de, 951*
- Hann, J. Handbuch der Klimatologie. Klima der Gemässigten und Polarzonen, *rev.*, 935
- Hannah, I. C. Eastern Asia. A History, *rev.*, 943
- Hanover, Diluvium in der Umgebung von. K. Olbricht, 315* ¶ Map of Hanover: Altsächsische Bauernhaus in Umkreise der Stadt Hannover, 878*
- Hansard, Capt. A. C. Early Days in Japan, 717*
- Hardy, J. A. Picturesque and Descriptive Tour in the Mountains of High Pyrenees, etc., 238*
- Hardy, Dr. M. Africa. Vegetation (Map), *n.*, 80
- Hardy, N. H., and E. W. Elkington. Savage South Seas, 400*
- Harfeld, Comm. F. Contributions à la géographie du Hou Nann, 870*

- Harford, Ch. F. Ratgeber für die Ausrüstung von Reisenden nach Übersee u. Tropen, *n.*, 216
- Haring, C. H. Buccaneers in the West Indies in the XVIIth Century, *rev.*, 457
- Harms, E., and O. Kämpfer. Geographische Seminar in Göttingen, 72
- Harper, L. F. Geology of the Murrumbidgee R. District, near Yass 477*
- Harper, R. M. Early Spring Aspects of Coastal Plain Vegetation of South Carolina, Georgia and N. E. Florida, 948*; Hempstead Plains, Natural Prairie on Long Island, 351; Quantitative Study of the more Conspicuous Vegetation of Certain Natural Subdivisions of the Coastal Plain, 66*, 553*; Summer Notes on Mountain Vegetation of Haywood Co., N. C., 66*; Wire-Grass Country of Southern Georgia, 522
- Harris, C. A., and J. A. J. de Villiers. Storm van's Gravesande. The Rise of British Guiana compiled from his despatches, 318*
- Harris, G. D. Oil and Gas in Louisiana with Brief Summary of their Occurrence in Adjacent States, 66*
- Harris, L. With Mulai Hafid at Fez, *rev.*, 459
- Harris, R. A. Arctic Tides, 202; Cotidal Lines for Arctic Regions (Map), 312*
- Harris, W. T. Erie Michigan Canal, 960*
- Harrar: Reise nach — und Adis Ababa. F. J. Bieber, 67*
- Hartmeyer, Dr. R. Ascidien der Deutschen Südpolar Expedition, 1901-3. Zoologie, 800*
- Hartshorne, A. C. Japan and Her People, 237*
- Hartz Mountains, Saxon, Switzerland, Rambles in. H. C. Andersen, 400*
- Harwood, W. A., *joint author*, see E. Gold.
- Hasanabad Glacier, Tongue of the — in 1908. Dr. W. H. Workman, 225*
- Hasluck, F. W. Cyzicus. Account of History, Antiquities . . . and Adjacent District, etc., *n.*, 930
- Hassel, J. M. von. Croquis de la Ciudad de Iquitos y sus Alrededores, 634*
- Hassert, Dr. K. Die räumliche Entwicklung Montenegros, 315*
- Hassinger, Dr. H. Über Aufgaben der Städtekunde, 316*; Geographische Verbreitung der Grossstädte, (Map), *n.*, 552
- Hassler, Dr. E., *joint author*, see Dr. R. Chodat.
- Hastings, J., J. A. Selbie and Others, *Editors*. Encyclopædia of Religion and Ethics, Vol. III, 320*
- Hatch, F. H. Catalogue of Collection of Rocks and Minerals from Natal and Zululand arranged stratigraphically, 555*
- Hausaland, From — to Egypt, through the Sudan. H. K. W. Kumm, *rev.*, 535
- Hauser, H., *joint author*, see H. Busson and J. Fèvre.
- Hausermann, R. Brazil segundo os mais recentes Trabalhos, 876*; Église catholique dans les Balkans (maps), 551*
- Haute-Loire et le Haut Vivarais. M. Boule, *n.*, 947
- Hautes-Pyrénées. Picturesque and Descriptive Tour in the Mountains of the High Pyrenees. J. A. Hardy, 238*
- Hauthal, Prof. Dr. R. Bismarck-Gletscher, ein vorrückender Gletcher in der patagonischen Cordillere, 476*
- Hautle-Hättenschwiller, Dr. A. Stand der schweizerischen Binnen-Schiffahrtsfrage, 478*
- Hautreux, A. Températures de l'Atlantique Nord (Surface et Profondeurs), 640*
- Havel and Elbe Junction: Havelwinkel, Lage der Siedlungen, *n.*, 234
- Havre, Agrandissement du — avant-port de Paris. L. Berthaut, 638*
- Hawaii, Territory of: ¶Hawaii and Its Volcanoes. C. H. Hitchcock, *rev.*, 210; Results of Observations made at Coast and Geod. Surv. Magnetic Observ. near Honolulu, 1907-8. D. L. Hazard, 870*; Volcanoes of Kilauea and Mauna Loa. W. T. Brigham, *n.*, 141 ¶Maps of Hawaii: Hawaiian Islands. Gen. Progress Sketch, Rep. 1909-10, 470*; Kahului Harbor and Approaches, Island of Maui, 76*
- Hawes, A. F. State Ownership of Forests, 553*
- Hayden, A. L. Riders of the Plains. Adventures . . . North-West Mounted Police, *rev.*, 61
- Hayden, H. H. Some Coal-fields in north-eastern Assam, 477*
- Hayes, Dr. C. W., Personal, 921
- Hazard, D. L. Directions for Magnetic Measurements, 867*; Results of Observations made at the Coast and Geod. Sur. Magnetic Observ. at Cheltenham, Md., 635*; — near Honolulu, 1907-8, 870*; — at Sitka, 1907-8, 867*
- Heath River. Maj. P. H. Fawcett, 555* ¶Map of Heath R. and Ad-

- jacent Territory. Maj. P. H. Fawcett, 391*
- Heaton's Annual. Commercial Handbook of Canada, etc., *n.*, 544
- Heawood, E. Claudius Clavus and the Early Geography of the North, 228*
- Heber, R. Narrative of a Journey through the Upper Provinces of India, from Calcutta to Bombay, 1824-1825, 319*
- Hebrides, From — to the Himalayas. Sketch of Wanderings in Western Isles and Eastern Highlands. C. F. G. Cumming, 320*
- Heckenroth. Rapport sur le fonctionnement du laboratoire de Brazzaville depuis 1906, 791*
- Hedin, Sven. Central Asia and Tibet, 237*; Le Désert de Lop à la lumière des récentes explorations, 791*; Kumdán Glaciers in 1902, 225*; Personal, 692
- Hedley, J. Tramps in Dark Mongolia, *rev.*, 209
- Heiderich, Dr. F. Hölzel's Wandkarte der Alpen auf Grundlage der V. v. Haardtschen Karte, *n.*, 79
- Heidke, Dr. P. Meteorologische Beobachtungen aus Deutsch-Ostafrika, 154*
- Heim, A., *joint author*, see E. Buss.
- Heinly, B. A. Carrying Water Through a Desert, Story of the Los Angeles Aqueduct, 221*
- Hellman, Dr. G. Über die extremen Schwankungen des Regenfalls, 73*
- Helps, A. Spanish Conquest of Mexico, and its Relation to the History of Slavery, etc., 318*
- Hempstead Harbor, L. I., Chart U. S. Coast and Geod. Sur., 545*
- Hempstead Plains. Natural Prairie on Long Island. R. M. Harper, 351
- Hennepin at the Falls of St. Anthony. N. H. Winchell, 714*
- Hennig, C. L. Streifzüge in den Rocky Mountains, 474*
- Hennig, Dr. R. Geographie und Verkehrswissenschaft, 794*; Russische Grossschiffahrtswege, 871*; Unternehmen der panamerikanischen Bahn, 313*
- Henrici, Capt. E. O. Height of Ruwenzori, 918
- Henry, J. D. Oil Fields of the Empire. Survey British Imperial Petroleum, etc., *rev.*, 148
- Henry of Portugal, Prince—and the African Crusade of Fifteenth Century. C. R. Beazley, 317*
- Henshaw, F. F. Mining in Seward Peninsula, 474*; see also E. C. La Rue, *joint author*.
- Herbermann, C. G., *Editor*. Catholic Encyclopedia. Vol. IX, 240*, Vol. X, 400*
- Herbertson, A. J. Oxford Geographies. Vol. III. Senior Geography, *n.*, 149; Physiographical Introduction to Geography, *n.*, 219
- Herculaneum, Buried —. E. R. Barker, *rev.*, 220
- Hermann, Dr. R. Transkontinentale Bahnen und die Kap-Kairo-Linie, 153*
- Hermannstadt, Geol. Übersichtskarte der Umgebung von, 957*
- Herrin, W. E. Water Powers in Northwest, 221*
- Herring, Report on — Investigations until Jan., 1910. J. Hjort, 559*
- Herzegovina and Bosnia: Bosnia-Erzegovina sotto l'aspetto storico, giuridico et economico. G. Giacchi, 157*; Grunds Studien zur Morphologie und Morphogenese der Hercegovina. N. A. Krebs, 638*
- Herzog, Dr. T. Explorations in Bolivia, 525
- Hess, F. L. Rare Metals, 789*
- Hesse, Dr. H. Finanzielle Entwicklung Kameruns, 153*
- Hessen, Beiträge zur Statistik des Grossherzogtums, 227* ¶ Map of: Übersichtskarte des Grossherzogthums, 798*
- Hettner, Dr. A. Arbeit des fliessenden Wassers, 317*; Terminologie der Oberflächenformen, 640*; Wüstenformen in Deutschland, 315*
- Heusler, J. J. Region Salitrera de Chile comprendida entre El Toco i Copiapó (Map), *n.*, 797
- Heungchow, Chart of newly established Port of — and Surrounding District, 231*
- Hevea brasiliensis*. See Para Rubber.
- Hewitt, C. G. Conservation, or the Protection of Nature, 789*
- Hickman, Prof. A. L. Geographisch-statist. Taschen-Atlas von Österreich-Ungarn, *n.*, 80
- Hidalgo y Costilla, Miguel. Life and Times of —. A. H. Noll, *rev.*, 374
- Hietzing-Umgebung, Karte der politischen Bezirkes —, *n.*, 233
- Higgins, D. F., *joint author*, see U. S. Grant.
- Himalayas: ¶ Call of the Snowy Harper. Narrative of Exploration and Mountaineering. W. H. Workman, *rev.*, 929; Five Months in —. A. L. Mumm, 319*; From Hebrides to the

- Himalayas. Sketch of Wanderings in Western Isles and Eastern Highlands. C. F. G. Cumming, 320*; Survey of. Dr. T. G. Longstaff, 396*, 638*  Map of Himalayas: Sketch Map to illustrate explorations of Dr. A. Neve, 957*
- Hinds, H., *joint author*, see C. T. Lupton.
- Hinks, A. R. Progress in Geodesy, 530
- Hintze, A. Beiträge zur Petrographie der älteren Gesteine . . . Kamerun, 555*
- Hispar, Les fronts des glaciers de Yengutsa et d'—. Dr. C. Calciati, 477*; The Call of the Snowy —, etc. W. H. Workman, *rev.*, 929
- Historical Geography. See under Geography.
- Hitchcock, Prof. C. H. Hawaii and its Volcanoes, *rev.*, 210; Personal, 294, 529
- Hjort, J. "Michael Sars" in North Atlantic Deep-Sea Expedition, 1910, 720*; Report on Herring Investigations, 559*
- Hobbs, W. H. Characteristics of Existing Glaciers, *rev.*, 934; Ice Masses on and about the Antarctic Continent, 398*; Pleistocene Glaciation of North America viewed in the Light of our Knowledge of Existing Continental glaciers, 641; Repeating Patterns in the Relief and the Structure of the Land, 719*; Requisite Conditions for the Formation of Ice Ramparts, 719*; Study of Damage to Bridges during Earthquakes, 74*
- Hochalmspitzgruppe, Karte der Ankogel —. Dr. E. Stummer, 233*
- Hochreutiner, Dr. B. P. G. Remarques sur la géographie botanique de Madagascar, 69*
- Höck, Dr. F. Zur Verbreitung einiger Nutzpflanzen, 952*
- Hodge, F. W. The Jumano Indians, 221*
- Hodson, F., *Editor*. Broad Lines in Science Teaching, *rev.*, 464
- Hoebel's Karte von China, *n.*, 232*
- Hoffer, Dr. M. Unterirdisch entwässerte Gebiete in Innerbosnien, 638*
- [Hoffman, C. F.] Winter in the West, 560*
- Hogg, T. J. Two Hundred and Nine Days; or, The Journal of a Traveller on the Continent, 239*
- Hokkaido, Map showing Relation of Volcanic and Seismic Phenomena in West —, 797*
- Hole, H. M. Agricultural Labor Conditions in Southern Rhodesia, 476*
- Hollick, A. Results of Prel. Study of so-called Kenai Flora of Alaska, 553*
- Holmes, J. S. Forest Fires and their prevention, etc., 960*
- Holmes, T. R. Ancient Britain and the Invasions of Julius Caesar, *rev.*, 142
- Holmes, W. H. Some Problems of the American Race, 151*
- Holty-Camagüey, R. J. Die Zuckerrohrkultur und Zuckerindustrie auf Cuba, 67*
- Holway, R. S. Extension of the Known Area of Pleistocene Glaciation to the Coast Ranges of California, 161; Topographic Environment of San Francisco, 789*
- Holzmann, M. Syrische Städtebilder. Aleppo, 717*
- Homburg, F. The Volga, 227*
- Honda, K., *joint author*, see S. Nakamura.
- Honduras: New Chapter in the History of, 949*; Notes on. R. H. Toll, 789*; Recent Discoveries in. A. H. Blackiston, 475*
- Hone, J. M., and P. L. Dickinson. Persia in Revolution, *rev.*, 462
- Hong Kong, Crime and Government at. T. C. Anstey, 236*
- Hooker, A., *Editor*. Official Proceedings of the Eighteenth National Irrigation Congress, *n.*, 218
- Hopkinson, Dr. E. Agricultural Labour Conditions in Gambia Protectorate, 556*
- Horton, A. H., *joint author*, see C. C. Covert and R. Follansbee.
- Hosseus, Dr. C. C. Reisbau in Siam, 870*
- Hotchkin, J. H. History of Purchase and Settlement of Western New York and Rise, Progress . . . Presbyterian Church in that Section, 236*
- Hotchkiss, C. W. Great Plains in Their Relation to Human Occupation and Development, 635*
- Hot Springs, Ark., Collecting Area of Waters of the hot springs in —. A. H. Purdue, 151*
- Hotz-Linder, Dr. R. Schweizer Schul-Kartographie, 871*
- Howarth, O. J. R. Geography of Ireland, *n.*, 866
- Howe, H., *joint author*, see J. W. Barber.
- Howell, Edwin E., *Obituary*, 624
- Hoyt, J. C. Water-Power Reconnaissance in S. E. Alaska, 474*
- Hrdlička, Dr. A. Some Results of Recent Anthropological Exploration in Peru, 619

- Huber, R. Empire Ottoman. Carte statistique des cultes chrétiens, *n.*, 312
- Hubert, H. Populations géophages de l'Afrique Occidentale, 716*; Le Relief de la Boucle du Niger, 716*
- Hudson Bay Region. Across Sub-Arctics of Canada. Journey of 3,200 miles by Canoe and Snowshoe through the —. J. W. Tyrrell, 319*; — Drainage Basin. R. Follansbee, A. H. Horton and R. H. Bolster, 867*; Hudson Bay Railway, 152*; — Route, 949*; Mediterranean of the North. Hudson Bay and its Coasts. New Route to Wheatfields, 152*
- Hudson Land. E. S. Balch, 445
- Hudson R.: From the Hudson to the Ohio. W. B. Wilson, 720*
- Hugershoff, Dr. Periodischen Fehler barometrisch bestimmter Höhenunterschiede in inneren Tropenzone, 73*
- Hughes, Mrs. T. F. Among the Sons of Han. Notes . . . Residence . . . China and Formosa, 237*
- Hulot, Baron. Coup d'œil sur les explorations françaises en Afrique au début du XX^e siècle, etc., 869*
- Humboldt, A. von. Cosmos: Sketch of Physical Description of the Universe, 320*
- Humphreys, W. J. Levels of Maximum and Minimum Cloudiness, 953*; Origin of Permanent Ocean Highs, 953*
- Hunan: ¶ Contributions à la géographie du Hou-Nann. Comm. F. Harfeld, 870*; Effort scolaire au Hounan, 156* ¶ Map: Itinéraire du Capitaine Harfeld . . . en 1903-4, 708*
- Hungarian Self-Taught. Thimm's System, etc. A. Count de Soissons, *n.*, 149
- Hungary. See also Austria-Hungary: ¶ Développement de la Hongrie. G. Blondel, 792*; Petroleum Investigations in — and Rumania, 859 ¶ Maps of Hungary: Geographische Verteilung der Gewitter in Ungarn, *n.*, 957; Geol. Karte des Zjargebirges, 879*; Geol. u. Top. Skizze des Zempléner Klippengebirges, 958*; Geol. Kartenskizze de Mezöhasz Massé, 958*; Geol. Übersichtskarte der Umgebung von Hermannstadt, 957*; Map of part of Görgény Mountains, 958*; Staatsrechtliche Karte des Ungarischen Reiches, *n.*, 957*; Tektonische Skizze des Zjargebirges und der angrenzenden Gebiete, 879*; Top. Kartenskizze des Zempléner Klippengebirges, 958*; Verbreitungsgebiet der deutschen Sprache im Südungarn. Dr. R. v. Pfaundler, 878*
- Hunsberg, Erkundung der. Leut. Drews, 396*
- Hunt, A. S. Oxyrhynchus Papyri. Part VIII. Edited with translations and notes by —, 880*
- Hunt, H. A. Rainfall of New South Wales, 527
- Hunter, Capt. F. F., Personal, 861
- Huntington Bay L. I. Sound, Chart U. S. Coast and Geod. Surv., 309*
- Huntington, E. Burial of Olympia, 398*; Fringe of Verdure Around Asia Minor, 70*; Karst Country of Southern Asia Minor, 91; Palestine and its Transformation, *rev.*, 461; Physical Environment as a Factor in the Present Condition of Turkey, 719*; —'s Work in Southwest U. S., 195
- Hurn, E. A. Wisconsin Women in the War between the States, 880*
- Hurst, C., The Book of the English Oak, *n.*, 944
- Hutchinson, H. N. The Story of the Hills. Popular Account of Mountains and How They were Made, 239*
- Hutereau, Lieut. A. Les Bakango, 314*; Documents ethnographiques congolais: Manyanga, Mafoto, 68*
- Hutter, D. Im Gebiet der Etosha-pfanne, 69*
- Hydrographic Offices: ¶ Bulletin hydrographique pour l'Année Juillet 1908-Juin 1909, (Bureau Conseil Permanent Intern. pour l'Exploration de la Mer), 74* ¶ Germany: Neuere ozeanographische Arbeiten der Deutschen Marine . . . Seewarte. Dr. G. Schott, 74*; Tabellarische Reiseberichte nach den meteor. Schiffstagebüchern, 74* ¶ Japan: Seven Maps of Japanese lakes, 550* ¶ Russia: Charts of Russian Coasts, 798*; Siberian Coasts, 799* ¶ United States: General Catalogue of Mariners' Charts and Books, 314*; Skeleton or Plotting Charts. Lieut. R. Stone, 635*; Pilot Charts of North Atlantic Ocean, 76, 158, 229, 309, 389, 470, 545, 632, of the South Atlantic Ocean, 158, 470* — of the North Pacific Ocean, 158, 229, 309, 389, 470,* — of the South Pacific Ocean, 158, 229, 470*

I.

- Ibn G'ubayr. Viaggio in Ispagna, Sicilia, Siria, Palestina . . . nel Secolo XII. Prima Traduzione . . . da C. Schiaparelli, *rev.*, 216
- Icebergs: Über die Entstehung der Eisberge. M. C. Engell, 399*
- Iceland: Beobachtungen am Longjökull und im Thorisdalur. L. Wunder,

- 226*; Concise Dictionary of Old Icelandic. G. T. Zoëga, *n.*, 213; Some Effects of Glacial Action in. F. E. Wright, 478*; Glazialgeologische Studien über die rezenten und diluvialen Gletschegebiete Islands. H. Reck, 793*; Meine vierte Islandreise, 1910. H. Erkes, 226*; Physiographical Features of. W. S. C. Russell, 489; Le voyage de M. H. Stoll à travers l'Islande, 793* ¶ Map of Iceland: Übersichts-karte der Gletschergebiete von Island. H. Reck, 711*
- Ice Ramparts, Requisite Conditions for the Formation of. W. H. Hobbs, 719*
- Ice, River: Gliederung der Flusseises und die Arten seiner Erscheinungen, 318*
- Idaho: ¶ Gas and Oil Prospects in Payette. C. W. Washburne, 474*; White Pines of — and Montana. Their Distribution, Quality and Uses. F. I. Rockwell, 867* ¶ Maps of Idaho: Geol. Maps of Upper St. Joe R. Basin. J. T. Pardee, 874*; Subletts Mts., Wyo. and Adjacent Portions of Idaho, 229*; Sulphur-Bearing Area near Soda Springs, 544; Map showing extent of Phosphate Reserve, 229*; Prel. Map and Structure Section of Georgetown Canyon Phosphate Area, 229*; Reconnaissance Sketch Map of Prospective Gas and Oil Fields near Vale, Ore. and Payette, Idaho, *n.*, 630; Top. Survey Meadows Quad., 873*, Pullman Quad., 308*
- Ihering, H. v. Revista do Museu Paulista. Vol. VIII, 960*
- Île d'Yeu à travers les âges, d'après la géologie, la cartographie et l'histoire. A. Pawlowski, 718*
- Ilg, A. Zur Geschichte der äthiopischen Eisenbahnen, 67*
- Illinois: ¶ Elizabeth Sheet of Lead and Zinc District of Northern. G. H. Cox, 553*; Geology and Mineral Resources of St. Louis Quad. N. M. Fenneman, 788*; Oil Fields in 1910. R. S. Blatchley, 394*, 635*; Oil Investigations in. R. S. Blatchley, 788*; Oil Resources of. R. S. Blatchley, 474*; Sketch of G. R. Clark's Campaign in — 1778-9, 400*; State Geological Survey of. F. D. De Wolf, 916; Studies of — Coal, 635*; Structural Materials in. J. A. Udden and J. E. Todd, 474*; Year-Book for 1909. Illinois State Geol. Sur., 715* ¶ Maps of Illinois: Carlyle, Hardinville, Murphysboro and Okawville Quadrangles, 75*; Geol. Map of the St. Louis Quad., 544*; Hennepin Quad., 629*; La Salle Quad., 873*; Map to show Oil Fields, Cross-Section Lines, etc., 546*
- Illinois R. Drainage Basin. R. Follansbee, A. H. Horton and R. H. Bolster, 948*
- Ilokono Dialect: *Iti Dalan Ti Santa Nga Krux* (The Way of the Holy Cross). Edited and compiled by F. C. Meredith, 880*
- Imfeld, X., et L. Kurz. Carte Albert Barbey. Chaîne du Mont-Blanc, *n.*, 551
- Imola, Pianta d'—Facsimile of MS. map by Leonardo da Vinci, 799*; Pianta Topografica della Città d'Imola [modern, added for comparison], 799*
- Incas, Land of the. Sir Clements R. Markham, 153*
- Indexes. See also Bibliography and Catalogues. ¶ The Annual Library Index for 1910. Edited by W. I. Fletcher and others, 560*; Egypt Exploration Fund. General Index to Archæological Reports. Vols. I-XVIII. W. L. Nash, Compiler, 960*; General Index to Publications of California State Mining Bureau. L. E. Aubury, 960*
- L. E. Aubury, 960*
- India: ¶ Descriptive: Among Indian Rajahs and Ryots. Sir Andrew H. L. Fraser, *n.*, 538; Dawn in Toda Land. C. F. Ling, *n.*, 305; Les fronts des glaciers de Yengutsa et Hispar. Dr. C. Calciati, 477*; Indian Alps and How We Crossed Them. By a Lady Pioneer. [N. E. Mazuchelli], 237*; Die indischen Grossstädte. Dr. K. Goës, 717*; L'Inde Britannique. Société indigène-Politique indigène, etc. J. Chailley, *rev.*, 207; Lord Curzon's Administration of India. Syed Sardar Ali Khan, *rev.*, 783; Les musulmans de l'Inde et le nationalisme hindou. H. Marchand, 638*; Narrative of a Journey through the Upper Provinces of India, from Calcutta to Bombay, 1824-1825. E. Heber, 210*; Sixty Days Marching through Ladak and Lahoul. Mrs. A. Schuster, 717*; On the Study of Indian Architecture. J. Fergusson, 239*; From Tonkin to India by the Sources of Irawadi. Prince Henri d'Orléans, 237*; Traveler's Notes, or, Notes of a Tour through India, Malaysia, etc., 1891-93. J. H. Veitch, 240*; Über das Verhältnis der Geschlechter in Indien. R. Kirchhoff, 225*, *n.*, 305; Village, Town, and Jungle Life in India. A. C. Newcombe, 319* ¶ Economic: L'Inde. Sa condition actuelle. E.

Clavery, *rev.*, 207; Indian Coal Output and Trade, 951*; Industrial Development in India. R. E. Forrest, 477*; Mineral Production during 1909. T. H. D. La Touche, 225*; Wirtschaftliche und politische Lage in British-Indien. F. W. Bickel, 870*. ¶ Historical: English Factories in, 1634-1636. W. Foster, 560*; History of India, from Earliest Times to the Present Day. L. J. Trotter, 319*; Illustrated History of British Empire in India, and the East from Earliest Times to . . . Sepoy Mutiny in 1859. E. H. Nolan, 319*; Tibetan Invasion of — in 647 A. D. and Its Results. L. A. Waddell, 396*; Records of Intelligence Department of the Government N. W. Provinces during Mutiny of 1857. W. Coldstream, *Editor*, 236* ¶ Government Reports: Extracts from Narrative Reports of Officers of Survey of India, 1908-9. Magnetic Survey, Tidal and Leveling Operations, Pendulum Operations, Triangulation in, 800*; General Report on Operations of Survey of — 1908-09. Col. F. B. Longe, 396*; — on Geol. Survey for 1909. T. H. D. LaTouche, 225*; Catalogue of Maps published by the Survey of, 800* ¶ Maps of India: Chart Illustrating Tibetan Invasion of Mid-India in 647 A. D. L. A. Waddell, 310*; Sketch to illustrate a journey into Abor Country. Col. D. M. Lumsden and N. Williamson, 709*; Stations of Observation of the Magnetic Survey, 160*; Verhältnis der Geschlechter in Indien, *n.*, 310; Volksdichte in der Oberen Gangesebene, etc. P. Böllert, *n.*, 472

French India: Statistiques du Commerce . . 1908. Établissements français dans l'Inde, 792*

Portuguese India: Itinerario Voyage ofte Schipvaert van Jan Huygen van Linschoten naar oost ofte Portugaels Indiën 1579-1592. Dr. H. Kern, *Editor*, 951*

Indian Archipelago. See Malay Archipelago.

Indiana: ¶ Physiographic Survey of an Area near Terre Haute. C. R. Dryer and M. K. Davis, 313*; Stratigraphy and Coal Beds of Coal Field. G. H. Ashley, 221*; Underground Waters of North-Central. S. R. Capps, 714* ¶ Maps of Indiana: Bloomington Quad., 75*; Clay City Quadrangle, 308*; Map of N. C. Indiana, showing Artesian Well Areas, 157*

Indian Ocean. Meteorological Charts of the, 158, 229, 309, 389, 632*

Indian Ocean, Islands of: South-West Indian Ocean. (Account of Aldabra and Neighboring Islands . . not explored by Prof. J. S. Gardiner). J. C. F. Fryer, 316*

Indian, Pacific and Atlantic Oceans: Forschungsreise S. M. S. Planet, 1906-7. Dr. W. Brennecke, Dr. Gräf, and Dr. A. Krämer, *n.*, 212

Indians, American: Chippewa Music. F. Densmore, 474*; Chumash and Costanoan Languages. A. L. Kroeber, 221*; Ethno-Botany of the Gosiute Indians. R. V. Chamberlin, 788*, 867*; Great Mysteries of the Cheyenne. G. B. Grinnell, 553*; Handbook of American Indians Languages, 367; Indian Tribes of the Lower Mississippi Valley and Adjacent Coast of the Gulf of Mexico. J. R. Swanton, 789*; Indian Languages of Mexico and Central America, and Their Geographical Distribution. C. Thomas and J. R. Swanton, 868*; Iroquis Uses of Maize and other Food Plants. A. S. Parker, 714*; Jumano Indians. F. W. Hodge, 221*; Myths and Legends of the Pacific Northwest. K. B. Judson, *rev.*, 373; Myths of the Uintah Utes. J. A. Mason, 221*; Old North Trail; or Life, Legends and Religion of the Blackfeet Indians. W. McClintock, *n.*, 533; Origin of Iroquois Silversmithing. A. C. Parker, 394*; Republic of Panama and its People, with Special Reference to the Indians. E. Y. Bell, 314*; Shasta Myths. R. B. Dixon, 394*; Siriono-Indianer in Ostbolivien. E. v. Nordenskiöld, 395*; The Snake Dance. M. L. Oliver, 714*; Unknown People in an Unknown Land. Account of Life and Customs of the Lengua Indians of Paraguayan Chaco, etc. W. B. Grubb, *rev.*, 458 ¶ Map: Indian Tribes of the Lower Mississippi and Adjacent Gulf Coast. John R. Swanton, 633*

Indies, East. See East Indies.

Indies, West. See West Indies.

Indo-China, French: ¶ Enseignement aux indigènes, *n.*, 149; L'Indo-Chine Française. L. Faque, *n.*, 376, —. H. Russier et H. Bernier, *rev.*, 931; De Saigon à Singapour, par Angkor autour du Golfe de Siam. Com. E. Lunet de Lajonquière, 225*; Situation économique, 951*; Statistique du Commerce,

- 1908, 792*; *Statistique de l'Industrie minière*, 1908, 792*, *Exploitation de la houille*, 870* ¶ *Maps of French Indo-China: Carte économique et administrative*, *n.*, 956*; *Carte physique*, *n.*, 956*; *Indo-Chine française*, 877*
- Indonesian Languages: *Gemeinindonesisch und Urindonesisch*. R. Brandstetter, 720*
- Industry and Commerce, Climate as related to —. J. F. Chamberlain, 317*; *Some Factors influencing the Location and Migration of Industries*. Prof. W. S. Tower, 639*
- Inness, R. T. A. *Climate and Rainfall of South Africa*, 197
- Innsbruck, Föhn Wind at, 621
- International Arbitration, Report of the Sixteenth Annual Meeting of Lake Mohonk Conference on. L. D. Powers, 318*
- International Year Book, The New —. *Compendium of World's Progress for 1910*, 640*
- Iowa: *Results of Spirit Leveling in — 1896 to 1909*. R. B. Marshall, 867*
- Iquitos, *Croquis de la Ciudad de — y sus Alrededores*. J. M. von Hassel, 634*
- Irak-Arabi: *Die künstliche Bewässerung Babylonien*. K. Ch. Christiansen, 155*
- Irawadi, *From Tonkin to India by the Sources of*. Prince Henri d'Orléans, 237*
- Ireland. See also United Kingdom: ¶ *Commerce de l'Irlande avec les pays étrangers*. J. P. Boland, 478*; *On Distribution of Mean Annual Rainfall . . . Area Including Counties of Dublin, Wicklow, etc.* W. J. Lyons, 398*; *Geography of Ireland*. O. J. R. Howarth, *n.*, 866; *Impressions d'Irlande*. A. Demangeon, 872*; *Irlande industrielle*. Sir Walter Richard Nugent, 227* ¶ *Map of Ireland: Map of Mean Annual Rainfall over Area including Counties of Dublin, Wicklow, Meath and Kildare*, 234*
- Iroquois: *Origin of — Silversmithing*. A. C. Parker, 394*; *Uses of Maize and other Food Plants*. A. S. Parker, 714*
- Isachsen, G. *Eisverhältnisse an den Küsten Spitzbergens sowie im Ost- und Westeise 1910*, 719*
- Isar, Tölz und — landschaft. J. Jaeger, 315*
- Island, *Formation of an — on Ögel Lake due to buoyancy of gases*, 623
- Isle-Dieu. See Île d'Yeu.
- Italy: *Appennino settentrionale e centrale*. F. Sacco, 793*; *Boll. delle Pubblicazioni ital. Ricevute per Diritto di Stampa*, 398*; *Distribuzione geografica della robustezza in Italia*. R. Livi, 793*; *Guide to Italy and Sicily*, *n.*, 785; *Il VII Congresso Geog. Italiano*, 478*; *Movimento della Popolazione . . . 1908*, 316*; *Riforme urgenti per la geografia nelle Università Italiane*. G. Dalla Vedova, C. Bertacchi and Others, 952*; *Terrazze orografiche dell'alto Picentino a nord-est di Salerno*. A. Galdiari, 603; *Val di Comino o Cominese*. Prof. R. Almagià, 639*; *Une Vallée tectonique. Doire Baltée en aval d'Aoste*. E. Argand, 478*; *Variations périodiques des glaciers. Alpes italiennes*. Prof. O. Marinelli, 478*; *Voyage pittoresque en Suisse et en Italie*. J. Cambry, 238 ¶ *Economic: Commercio e l'industria dei prodotti forestali in*. Prof. G. Assereto, 227*; *Aus dem italienischen Marken*. Dr. E. Schmidt, 398*; *Studien über den Hanfbau in Italien*. Dr. W. F. Bruck, 719*, 793*; *Relazione sui servizi dell'emigrazione per l'anno 1909-10*, 719*; *Statistica della Emigrazione . . . 1908 e 1909*, 316* ¶ *Maps of Italy: Carta fisico-politica delle 69 Province Amministrative, etc.*, *n.*, 393; *Carta d'Italia*, *n.*, 311; *Carta Politico-Amministrativa del Regno d'Italia colle linee ferroviarie e di navigazioni*, *n.*, 393; *Goode's Base Map*, *n.*, 712; *Schizzo geotettonico dello Appennino settentrionale e centrale, secondo i rilevamenti geol.* di F. Sacco, 311*; *Three Sections of the Map of Italy showing different Editions together with Plates of Conventional Signs*, *n.*, 960
- Ivory Coast: *Boundary between Liberia and —*, 855; *Pacification de la Côte d'Ivoire*, 154*; —. E. Dupuy, 396*; *Littoral et les lagunes de la —*. G. Joseph, 950*; *Pêcheries de la Côte d'Ivoire*. A. Gruvel, 716*; *Statistiques du Commerce . . . 1908*, 556*
- Ivory Islands in the Arctic Ocean. Rev. D. G. Whitley, 398*
- Ixmiquilpan, *Croquis geologico y topográfico del Valle de (map)*, 231*
- Izard, A. *Exploitation de l'Alfa et les ressources naturelles dans l'Annexe d'El-Aricha*, 476*
- J.
- Jaccard, Dr. P. *Nouvelles recherches sur la Distribution florale*, 74*
- Jacob, C. *Études récentes sur les glaciers du Dauphiné*, 73*; *Schéma des extensions glaciaires les plus récentes*

- dans le Massif des Grandes Rousses, 393*; Schéma orogr. et hydrogr. du Massif des Grandes Rousses, 393*
- Jaeger, F. Allerlei Beobachtungen über Schnee und Zackenfirn, 479*; Das Hochland der Riesenkrater und die umliegenden Hochländer Deutsch-Ostafrikas, Teil I, 716*; Wesen und Aufgaben der kolonialen Geographie, 953*; — and W. Rux. Abflusslose Rumpfschollenland zwischen Iramba, Njarasasee, usw. (Map), *n.*, 548; — Hochland der Riesenkrater und die südlich anschliessenden Gegenden bis zum Hanang, usw. (Map), *n.*, 547
- Jaeger, J. Tölz und die Isarlandschaft, 315*
- Jaffa. Dr. L. Saad, 155*, plan of, 79*
- Jahn, A. Vias de Comunicación... Venezuela, 950*
- Jahr, A. Geographical Instruction in German Elementary Schools, 639*
- Jahresbericht* der Geograph.-ethnographischen Gesellschaft in Zurich, 1909-10, 316*
- Jamaica: Agricultural Labour Conditions in. A. H. Miles, 475*; Flora of. Containing Description of Flowering Plants from the Island. W. Fawcett and A. B. Rendle, 800*; Geomorphologische Studien im Karstgebiete Jamaikas. Dr. J. V. Danès, 67*
- Jamaica Bay and Rockaway Inlet, L. I., Chart U. S. Coast and Geod. Surv., 631*
- James River Drainage Basin, 475*
 ☞ Chart: Hampton Roads to Point of Shoals, 309*
- Jamison, C. E. Mineral Resources of Wyoming, and Mining Laws of the State and the U. S., 880*
- Jan Mayen, Expedition to —, 451; — Expedition of 1911. W. S. C. Russell, 881
- Japan: ☞ Art and Art Industries in Japan. Sir Rutherford Alcock, 236*; Awakening of. Okakura-Kakuzo, 400*; Early Days in. Capt. A. C. Hansard, 717*; Guide to Japan, Keeling's, etc., 4th Ed., revised... A. Farsari, 237*; Japan and Her People. A. C. Hartshorne, 237*; — Antarctic Expedition, 291; Japanese improving their Live Stock, 856; Kolonialpolitik. F. Wertheimer, *n.*, 377; Land of the Morning. Account of Japan and its People. W. G. Dixon, 236*; Mining in, *n.*, 701; Outlines of Agriculture in, *rev.*, 700; With Russian, Japanese and Chinese. Experiences of an Englishman during the Russo-Japanese War. E. Brindle, 320*; Sailing Directions and Nautical Remarks: by Officers... command of Commodore M. C. Perry, 237*; Seiches in some Lakes of. S. Nakamura and K. Honda, 717*; Traveller's Notes; or, Notes of a Tour through India, Malaysia, Japan... 1891-93. J. H. Veitch, 240*; True Description of the Mighty Kingdoms of Japan and Siam. Written Originally in Dutch by F. Caron and Joost Schorten, etc. (1671). R. Manley, 237*; Usu-San Eruption and Earthquake and Elevation Phenomena. F. Omori, 951*
 ☞ Maps of Japan: Geol. Map of Japanese Empire, *n.*, 709; Geol. Map showing Distribution of Stream-Tin in Environs of the Town of Naegi, 877*; Distribution of several types of Copper Deposits, 709*; Map of Esan Volcano, 877*; Usu Volcano, *n.*, 877*; Topographic features of Usu-san, and Vicinity, 797*; Top. Map of northern flank of Usu-san showing distribution of 45 Craterlets, etc., 797*; Relation of Volcanic and Seismic Phenomena in West Hokkaido, 797*; Maps of Japanese Lakes. Naval Hydrog. Office, 550*
- Jasper Park, Alberta, Coal Fields of. D. B. Dowling, 948*
- Java: ☞ Führer auf-. L. F. M. Schulze, 400*; Ceylon, Malay States and — compared as Plantation and Residential Colonies. J. Ferguson, 638*
 Map of Java: ☞ Stand van de Landrente-Metingen op Java en Madoera, 160*
- Jefferson, M. Culture of the Nations, 241; Real New York in 1910, 737
- Jenkins, Hon. J. G. Papua and the Papuans, 558*
- Jensen, H. J. Climates of the Geological Past, 317*
- Jentsch, Dr. Urwald Kameruns, 636*
- Jerid, Date Gardens of the. T. H. Kearney, 556*
- Jesuits: Catalogo de los Manuscritos relativos a los Antiguos Jesuitas de Chile, etc., 640*
- Jimenez, C. P. Estadística Minera en 1908 [Peru], 67*
- Johnson, C. Highways and Byways of the Rocky Mountains, *rev.*, 373
- Johnson, D. W. Hanging Valleys of the Yosemite, 826, 890; History of Grand Canyon District, 285
- Johnson, J. P. Pre-Historic Period in South Africa, *rev.*, 537
- Johnson, N. M., Method of Mapping the Distribution of Marine Algæ, 399*

- Johnston-Lavis, Prof. H. J. *Mécanisme de l'activité volcanique*, 73*; *Mechanism of Volcanic Action*, 479*
- Johnston, Pa. and Vicinity, *Mineral Resources of*. W. C. Phalen and L. Martin, 553*
- Johnston, Sir Harry. *Britain Across the Seas*. Africa, *rev.*, 375
- Johnston, W. A. *Simcoe District, Ontario*, 949*
- Jolliet, Louis, *Découvreur du Mississipi et du pays des Illinois, etc.* E. Gagnon, 318*
- Joly, A. *Notes géographiques sur le Sud Tunisien*, 69*
- Jones, E. D. *Causes of Increased Cost of Agricultural Staples, etc.*, 399*
- Jones, H. O. *Some Climbs on the South Side of Mont Blanc*, 793*
- Jonghe, Ed. de, *joint author*, see C. van Overbergh.
- Jorat. *Esquisse géographique*. C. Biermann, 478*
- Jordan, D. S., *et al.* *Fur Seals and Fur-Seal Islands of the North Pacific Ocean*, 239*; *Personal*, 861
- Jordan Valley: *Aufnahmen des Ostjordanlandes durch den Deutschen Palästina-Verein*. Prof. Dr. Guthe, 397*
- Joubin, L. *Études sur les Gisements de Mollusques comestibles des Côtes de France*, 315*
- Jourdan, P. *Cecil Rhodes. His Private Life, rev.*, 536
- Juarez, *Refutación a Don Francisco Bulnes por* —. G. García, 480*
- Juba River: *Basso Giuba italiano e le concessioni agricole nella Goscia*. Capt. G. Ferrari, 69*
- Judson, K. B. *Myths and Legends of the Pacific Northwest, rev.*, 373
- Julien. *Textes relatifs aux conditions de l'agriculture sous l'ancien gouvernement malgache*, 154*
- Jumano Indians. F. W. Hodge, 221*
- Jura français, *Dérivations glaciaires de cours d'eau dans la Suisse occidentale et le*. Prof. H. Schardt, 71*
- Jurjura Mts.: *Étude phytogéographique de la Kabylie du Djurjura*. G. Lapie, 314*
- Jutland, *Fixation of Dunes on the Coast of*. W. J. Morrill, 718*
- Jutson, J. T. *Contribution to Physical History of Plenty R. and Anderson's Creek, Warrandyte, Victoria*, 226*
- K.
- Kabylia: *Étude phytogéographique de la Kabylie du Djurjura*. G. Lapie, 314*; *Kahului Harbor, Maui Is., Chart U. S. Coast and Geod. Surv.*, 76*
- Kaiser Wilhelm-Kanal, *Verkehr im — während des Rechnungsjahrs 1910*, 871*
- Kaiser Wilhelms Land. See also *German New Guinea: In das Hinterland der Nordküste des*. Dr. G. Friederici, 156*; *Erforschung des Kaiserin Augusta-Flusses*. A. Penck, 952*
- Kaiserin-Augusta, *Erforschung des — Flusses*. A. Penck, 952* ¶ *Map of: Keizerin Augusta-Rivier, n.*, 392
- Kalahari, *Meine Beide — Reisen 1908-09*. Dr. R. Pösch, 396*; *Deutsche Süd-Kalahari*. Dr. P. Range, 869*
- Kalisch, R. *Trade Routes. Past and Present — East and West*, 399*
- Kamerun. ¶ *Beiträge zur Petrographie der älteren Gesteine . . . Kamerun*. A. Hintze, 555*; *Bericht über die astron. Ortsbestimmungen welche . . . Hauptmann Foerster und Oberleut. Schwartz . . . ausgeführt haben*. Dr. Ambronn, 223*; — *über die astron. — geodät. Ergebnisse der deutsch-französ. Exped. zur Aufnahme des Ostkamerun-Grenzgebietes*. Dr. L. Ambronn, 223*; *Bericht über eine Bereisung des Ostgrenzgebietes der Residentur Adamaua*. K. Strümpell, 555*; *Entwicklung Nordkameruns*. Lieut. Dühring, 555*; *Ergebnisse der Regenmessungen in Kamerun, 1909*, 153*; *Finanzielle Entwicklung —s*. Dr. H. Hesse, 153*; *Der Fischfang der Eingeborenen in den Kolonien Westafrikas*. Dr. A. Gruvel, 791*; *Zur Geologie von —*. B. Struck, 870*; *Geomorphologische Probleme aus —*. Dr. S. Passarge, 153*; *Kameruner Probleme*. Dr. Külz, 152*; *Niederschlagsregister. am Kamerungebirge, 1909-10, unter Berücksichtigung täglichen Regenverteilung in den Tropen*. K. Langbeck, 555*; *Südbahn, 396**; *Unsere Kameruner Eisenbahnen*. E. Walter, 314*; *Urwald Kameruns*. Dr. Jentsch, 636* ¶ *Map of: Stand der geologischen Erforschung des Schutzgebietes —*. O. Mann, 956*
- Kämpfer, O., *joint author*, see E. Harms. 72*
- Kamchatka, *Travels in — and Siberia, with Narrative of Residence in China*. P. Dobel, 236*
- Kansas: ¶ *Analyses of Crude Petroleum from Oklahoma and Kansas*. D. T. Day, 151*; *Kansas and the Country Beyond . . . from Missouri to the Pacific Ocean, etc.* J. Copley,

- 318*; — and Nebraska Handbook for 1857-8. N. H. Parker, 236*; Results of Spirit Leveling in, etc. R. B. Marshall, 948* ¶ Maps of Kansas: Geological Map of Kansas, 874*; Leavenworth Quad., 75*
- Kansas University Science Bulletin*, 152*
- Kansu: Dr. Stein's Maps from Chinese Turkestan and Western —, 450
- Kapteyn, Dr. J. C. Recent Researches in the Structure of the Universe, 640*
- Karakoram: ¶ Expedition of the Duke of the Abruzzi to the Karakoram Himalayas. F. de Filippi, 225*; Kumdan Glaciers in 1902. Dr. S. Hedin, 225*; Salto Pass. T. G. Longstaff, 792* ¶ Maps of Karakoram: Explorations in Eastern — by T. G. Longstaff, *n.*, 550; Karakoram Himalayas. Upper Basin of the Baltoro Glacier, Goodwin Austen Glacier and tributaries, *n.*, 160
- Karaböğ. The Romano-Nubian Cemetery. C. L. Woolley and D. Randall-MacIver, *n.*, 388
- Kara Sea. ¶ Über die Fahrten der Novgoroder durchs karische Meer. und . . Halbinsel Jalma zum Ob. A. Sibirakoff, 70*; Rapport sur l'expédition polaire néerlandaise qui a hiverné dans la mer de Kara en 1882-83. M. Snellen et H. Exama, *rev.*, 146
- Karen Hills, Sketches from. A. Bunker, *n.*, 65
- Karst. Zur Frage des Grundwassers im. Dr. A. Grund, 157*; Die unterirdische Entwässerung im. L. Waagen, 315*
- Karst Phenomena: Geomorphologische Studien im Karstgebiete Jamaikas. J. V. Danès, 67; Karst Country of Southern Asia Minor. E. Huntington, 91; Das Karstphänomen. A. Grund, *rev.*, 215; Unterirdisch entwässerte Gebiete in Innerbosnien. Dr. M. Hoffer, 638*
- Kasai, Commerce dans le bassin du, 68*; Prospects of Rubber Plantations in, 869*
- Kasai-Sankuru, La navigabilité du, 716*, 791*
- Kasasig, Prof. N. Griechen und Bulgaren im neunzehnten und zwanzigsten Jahrhundert, *n.*, 144
- Kashmir, Map: Sketch Map to illustrate explorations of Dr. A. Neve in the Himalayas, 957*
- Kaskaskia R. Drainage Basin. R. Follansbee, A. H. Horton and R. H. Bolster, 948*
- Katanga: ¶ Le commerce au. G. de Leener, 869*; Le Congo au Parlement. Concessions minières au, 314*; Sur les hauteurs du — du lac Moero à Lukafu. Comm. J. Morisseau, *n.*, 695; Heutige Katanga. E. Zimmermann, 68*; Immigration au, 153*; Les Mines de cuivre du. E. Zimmermann, 153*; Le Katanga, 68*; Reserves diamantifères du, 950*; Véritable signification du — pour la Belgique. P. Forthomme, 950* ¶ Maps of Katanga: Carte du District du. H. Droogmans, *n.*, 471; Voies d'accées vers le, *n.*, 78
- Kataphronète, M. Annexion et le Régime intern. de la Corée, 225*
- Katscher, L. Das chinesische Fischerwesen, 156*
- Katz, F. J., *joint author*, see L. M. Prindle.
- Kaufmann, H. Die Auin. Beitrag zur Buschmannforschung, 154*
- Kaunhowen, F. Beobachtungen über Diluvium, Tertiär und Kreide in Ostpreussen, 558*
- Kayser, Dr. E. Lehrbuch der Geologie, *rev.*, 307
- Kearney, T. H. Date Gardens of the Jerid, 556*
- Keeble, F. Plant-Animals, *n.*, 947
- Keele, J. Clay Resources of Western Provinces [Canada], 949*
- Keeler, C., *joint author*, see Wm. H. Dall.
- Keeling's Guide to Japan, —, etc., 4th Ed.; revised . . . by A. Farsari, 237*
- Keewatin, Climate and Physical Condition of. A. P. Coleman, 394*
- Keller, Dr. C. Distribution géographique des races antiques parmi les animaux domestiques, 74*
- Keltie, J. S. Recent Progress of Geographical Education in Great Britain, 872*
- Kenai Peninsula: ¶ Glaciers of the Southern Coast of the. U. S. Grant and D. F. Higgins, 721; Prel. Report on Mineral Resources of Southern part of. U. S. Grant and D. F. Higgins, 151* ¶ Map of Kenai Peninsula: Reconnaissance Map of S. W. part, 308*
- Kennan, G. Tent Life in Siberia, *n.*, 209
- Kentucky Maps: Dawson Springs Quad., 629*; Princeton Quad., 75*
- Kermadec Islands, Petrological Notes on Rocks from —, with some Geological Evidence for Existence of Subtropical Pacific Continent. R. Speight, 70*

- Kermorgant, Dr. Alcoolisme dans les colonies et les pays tropicaux, 479*
- Keyes, C. R. Abundance of Meteorites on the Painted Desert, and Its Bearing upon Planetesimal Hypothesis of the Origin of the Earth, 560*; Relations of Present Profiles and Geol. Structures in Desert Ranges, 474*
- Key West Harbor and Approaches, Chart U. S. Coast and Geod. Surv., 545*
- Khont-Hon-Nofer. The Lands of Ethiopia. H. K. W. Kumm, *rev.*, 925
- Kiachta. A. Schönebeck, 224*
- Kientchang et Lolotie. Chinois—Lolos—Sifans, Dr. A. F. Legendre, *n.*, 376, 717*
- Kilauea and Mauna Loa, Volcanoes of. W. T. Brigham, *n.*, 141
- Kimakowicz-Winnicki, M. von. Spinn- und Webewerkzeuge, 72*
- Kimberley, Some Observations of Dew at. J. R. Sutton, 55
- Kindle, E. M. Southerly Extension of Onondaga Sea in the Alleghany Region, 714*
- Kingston, The Story of Old —. A. M. Machar, *n.*, 532
- Kirchhoff, R. Über das Verhältnis der Geschlechter in Indien, 225*, *n.*, 305
- Kirghize, La question — et la colonisation des Steppes. M. J. Castagné, 477*
- Kirschstein, E. Fr. Heissen Quellen von Mt. Agata in Karagwe, 154*
- Kislovodsk, Climate of — and Comparison with Other Climatological Stations. [In Russian.] A. Voikov, 793*; Map, *n.*, 549
- Kissingen: Beziehungen zwischen Regenfall u. Quellergiebigkeit unter besonderer Berücksichtigung Münchener Wasserversorgung und der Kissinger Quellen. Dr. L. Frank, 871*
- Kites: Drachenbeobachtungen an Bord "de Ruyter" angestellt vom A. E. Rambaldo während der Fahrt nach Ost-Indien und . . . Aufenthals in W.-Indien, 1909. Dr. E. van Everdingen, 720*; Photographie en Cerf-Volant. Dr. M. D'Halluin, 872*
- Kjellén, R. Die schwedischen Erdbeben, 398*; Seismische Karte von Schweden, 80*
- Klautzsch, A. Der jüngste Vulkanausbruch auf Savaii, 558*
- Kleinkemm-Kettwig, Dr. Erforschung der Namib, 69*
- Klipstein, A. V. Beiträge zur geologischen und topographischen Kenntnis der östlichen Alpen, 238*
- Klotz, O. Earthquake Epicentres, 399*; Microseisms, 399*; Seismograph, 399*
- Klubbhütten-Album des Schweizer Alpen-Club, 880*
- Knoch, Dr. K. Die Winde in Deutschland, 793*
- Knopf, A. Geology of Berners Bay Region, Alaska, 635*; Mining in S. E. Alaska, 474*
- Knörzer, A. Anormale Temperaturverteilung im unterfränkischen Main- und Saaletal, 71*
- Kob, Dr. C. West-Masuren, *n.*, 144
- Koch, Capt. K. F. Explorations in W. New Guinea, 857
- Koch, Dr. M. Beiträge zur Kenntnis der Höhengrenzen der Vegetation im Mittelmeergebiet, *n.*, 933
- Koch-Grünberg, Dr. T. Forschungsreise des Dr. H. Rice im Flussgebiet des Rio Caiahy-Uaupés, 950*; — Returns to the Amazon Basin, 525
- Koebel, W. H. Uruguay, *rev.*, 695
- Koert, W., und F. Tornau. Zur Geologie und Hydrologie von Daressalam und Tanga, *n.*, 927
- Konakry, Chemin de fer de — au Niger. A. Terrier, 154*
- Konczak, M. Maps illustrating "Les Cirques de Montagne" (Alpes fribourgeoises et Tatra), 958*, 959*
- Kongolo-Bukama, Navigabilité du bief, 791*
- Kootenay, Reconnaissance in East —. S. J. Schofield, 949*
- Köppen, W. Luftbahnen am Erdboden und in der freien Atmosphäre, 317*; Wodurch ist die hohe Wärme Europas und des Nordatlantischen Ozeans bedingt?, 638*
- Korea: ¶ Annexion et le Régime international de la Corée. M. Kataphronète, 225*; Foreign Trade, Agriculture, etc., 951*; Korea. C. J. D. Coulson, *n.*, 377 ¶ Maps of Korea: Dr. B. Kotô's Geol. Sketch Map of Hol-gol District, 79*; Map showing Distribution of Iron Ore in —, 877*
- Kossina, Dr. G., *Editor*. Kunst- und Völkerentwicklung, *n.*, 216
- Kotô, Dr. B. Geologic Sketch Map of Hol-gol District, 79*
- Kotzebue, A. von. Travels from Berlin, through Switzerland to Paris in 1804, 238*
- Kozlov, Col. P. K. Mongolian-Szechuan Expedition of the Imp. Russian Geog. Soc., 396*; Spedizione nella Mongolia e nel Seciu, 951*; Personal, 372
- Krämer, Prof. Dr. A. Anthropologie und Ethnographie (Forschungsreise S. M. S. Planet), *n.*, 212; Verlauf der

- Deutschen Marine-Expedition 1907-9, 226*
- Kramm, H. E. Serpentine of Central Coast Ranges of California, 151*
- Krause, C. Notes on German South-West African Diamonds, 637*
- Krause, G. A. Beitrag zur Kenntnis des Klimas von Salaga, Togo und Goldküste, 950*
- Krebs, N. A. Grunds Studien zur Morphologie und Morphogenese der Hercegovina, 638*
- Krebs, W. Das Erdbild in Mondentfernung, 953*
- Kretschmer, K., Portolani italiani del Medioevo. Secondo l'opera di —. C. Errera, 953*
- Kreyenberg, Dr. Beitrag zur Kenntnis der Fische des Jangtze und seiner Zuflüsse, 70*
- Krischtawowitsch, N. J. Sur la dernière période glaciaire en Europe et dans l'Amérique du Nord en rapport avec la question de la cause des périodes glaciaires en général, 317*
- Kroeber, A. L. Chumash and Costanoan Languages, 221*; Morals of Uncivilized People, 399*
- Krüger, Dr. G. Sturmflut an der Küste Pommerns, Dez., 1904 (Map), 710*
- Krüger, Prof. P. Andine Gebiet Patagoniens zwischen 40° und 44° S. (Map), *n.*, 634; Die Patagonischen Anden zwischen dem 42. und 44. Grade s. Breite, 949*
- Krumm, Dr. K. Map showing —'s Route in Central Africa, 472*
- Kubus of Sumatra, Absence of Religious Conceptions among the. Prof. W. Volz, 686
- Kühn, F. Beiträge zur Kenntnis der Argentinischen Cordillere, 555*, 847; Croquis-Itiner. de de Rosario de Lerma hasta Cachi (Map), 471*; Kühn in the Andes, 524
- Kuhnert, M. Schulwandkarte vom Königreich Bayern, *n.*, 235; — and Dr. G. Leipoldt. Asia (Physical Wall Map), *n.*, 235
- Külz, Dr. Kameruner Probleme, 153*
- Kumdan Glaciers in 1902. Dr. S. Hedin, 225*
- Kumm, H. K. W. From Hausaland to Egypt, through the Sudan, *rev.*, 535*; Khont-Hon-Nofer. The Lands of Ethiopia, *rev.*, 925
- Kümmel, H. B. Notes on Mineral Industry (N. J.), 714*
- Kurdistan. ¶Kurdistan—ein länderkundlicher Begriff? E. Banse, 951*; Reisebilder aus Mesopotamien und Kurdistan. Dr. H. Frh. v. Handel-Mazzetti, 557* ¶Map of Kurdistan: Tektonische Bedingtheit der Kurden-sitze, 709*
- Küstendil, Durch das Strumadefilee nach der bulgarischen Thermenstadt —. F. Meinhard, 315*
- Kyoto: Guide to the Celebrated Places in Kiyoto & the Surrounding Places for the Foreign Visitors. K. Yamamoto, 560*
- L.
- Labbé, P. Le progrès du Transsibérien, 224*; A travers la Serbie, 793*
- Laboulaye, E. de. Chemins de fer chinois, 637*
- Labrador, Across — from Nain to George or Barren Grounds River. H. H. Prichard, 152*; Beyond the Height-of-Land. R. McFarland, 635*; Les Esquimaux du Nord-. S. Waldmann, 554*; Five Months in — and Newfoundland during the summer of 1838. E. W. Tucker, 480*; Labrador. Dr. W. T. Grenfell, 789*; Land of Eternal Warring. W. T. Grenfell, 222*
- La Bruyère, R. Trois archipels de la Polynésie orientale. Samoa, Îles sous le Vent, Marquises, 638*
- Ladak and Lahoul, Sixty Days Marching through. Mrs. A. Schuster, 717*
- Lagally, Dr. M. Alpeiner Ferner in Stubaï 1909, 477*; Gletscherbeobachtungen in Selrain und nördlichen Stubaï 1909, 477*
- Lager, E. Les steppes de l'Ancien Monde, 792*
- La Guaira: Ferrocarril de — a Caracas. J. Flind, 636*; La Guaira the picturesque. I. A. Manning, 153*; Plano para el Estudio de la Desviación de la Plomada en, 876*
- Lahitte, E. Milling Industry in Argentina, 314*
- Laing's (Major Gordon) Grave Discovered, 525
- La Jonquière, (Lajonquière), Comm. E. de. A propos de deuxième session du Conseil fédéral des États malais, 638*; A travers le Siam, 477*
- Lakes: ¶Bathymetrical Survey of Scottish Fresh-Water Lochs, *rev.*, 933; Ergebnisse neuerer simultaner Temperaturmessungen in einigen tiefen Seen Europas. Dr. W. Halb'ass, 317*; Instrumental Survey of Shorelines of Extinct Lakes Algonquin and Nipissing in S. W. Ontario. J. W. Goldthwait, 949*; Zur Kenntnis der Seen der Hohen Tatra. Prof. Dr. Halb-

- fass, 477*; Lakes of Guatemala. E. F. Tisdell, 395*; Lakes of the Salt Range in Punjab. T. H. D. La Touche, 225; Seiches in some lakes of Japan. S. Nakamura and K. Honda, 717*; Zur Verbreitung und Entstehung der Posener Seen. H. Schütze, 639*; Wirtschaftliche Bedeutung der Binnenseen. Prof. Dr. W. Halbfass, 399* ¶ Maps of Lakes: Lacs Égéen et Pannonien, etc., Carte du Lac Égéen. J. Cvijić, 710; Position of Lake Shang-ie, 709*; Schetskaart van het Sentani-Meer, Noord Nieuw-Guinea. F. J. P. Sachse, *n.*, 957
- Lala, R. R. Philippine Islands, 400*
- Liberté, F. Une Expédition dans l'Abitibi, 715*
- Lallemand, Ch. Nivellement général de la France, progrès de 1899 à 1908, 71*; Maps for Airships, 922; Résultats scientifiques de la mission Tilho, 223*
- Land-Bridge, On Evidences of a Former — Between Northern Europe and America. R. F. Scharff, 228*
- Landensio, E. Excursion a la Caverna de Cacahuamilpa y Ascension al Crater del Popocatepetl, 236*
- Lander, Richard, and Mungo Park, Memorial to, 918
- Landes, H. Road Materials of Washington, 880*
- Land Forms. See also Geomorphology: Notes on the Description of Land Forms. Prof. W. M. Davis, 46, 190, 598, 679, 847; Place of Deduction in Description of Land Forms. W. M. Davis, 598; Repeating Patterns in the Relief and in the Structure of the Land. W. H. Hobbs, 719*; Land Reliefs that are True to Nature. G. C. Curtis, 418
- Landor, A. H. Savage. Sources principales du Brahmapoutre et du Sutledje, 225*
- Landscapes: Interprétation géographique des paysages. P. Vidal de la Blache, 873*
- Landslides: Der Bergsturz von Elm den 11. September 1881. E. Buss and A. Heim, 238*
- Langbeck, K. Lightning Strokes and Telephones, 920; Niederschlagsregistr. am Kamerungebirge . . . 1909-10, unter Berücksichtigung täglichen Regenverteilung in den Tropen, 555*
- Lange, A. Rubber Workers of the Amazon, 33
- Langheld, Maj. W. Wirtschaftlichen Fortschritte in unseren afrikanischen Kolonien, 791*
- Languages: ¶ Expansion de la langue française dans le monde. J. de Novicov, 479*; Finnish Self-Taught. A. Renfors, *n.*, 149; Gemeinindonesisch und Urindonesisch. R. Brandstetter, 720*; Handbook of American Indian Languages, 367; Hungarian Self-Taught. Count de Soissons, *n.*, 149; Ilokono Dialect: *Iti Dalan Ti Santa Nga Kruz* (The Way of the Holy Cross). Edited and compiled by F. C. Meredith, 880*; Indian Languages of Mexico and Central America and Their Geographical Distribution. C. Thomas and J. R. Swanton, 868*; Linguistische Probleme in ethnol., anthrop., und geogr. Beleuchtung. Dr. A. Dirr, 318*; Travellers' Practical Manual of Conversation in English, French, German and Italian, *n.*, 149; Living Speech in Central and South Africa. Essay Introductory to Bantu Family of Languages. A. C. Madan, *rev.*, 925 ¶ Maps: Germany: Die Muttersprache, etc., 878; Linguistic Map of Mexico and Central America (Bur. of Ethnology). C. Thomas and J. R. Swanton, 706*; Sprachkarte des Gebietes zwischen Kongo und Ubangi. F. R. Thonner, *n.*, 159; Verbreitungsgebiet der deutschen Sprache in Ungarn, 878
- Lanman, C. Bohn's Hand-book of Washington, 400*
- Laos, Un Voyage au. E. Lefèvre, 237*
- Lapie, G. Étude phytogéographique de la Kabylie du Djurjura, 314*
- Laplace [Cyrille Pierre Théodore]. Voyage autour du Monde. Exécuté pendant 1830-32 sur la Corvette La Favorite, Atlas Hydrogr., 239*
- Lapland: ¶ Lappland. Erinnerungen an den Intern. Geologenkongress 1910. W. v. Seidlitz, 793*; Visit to —. A. L. Cross, 398* ¶ Maps of Lapland: Carte de la Laponie suédoise indiquant la distribution des gisements de pin sylvestre et de bouleau subfossiles. A. Gavelin, 551*; Carte des limites de la végétation forestière dans la vallée du Kamajokk, 552*
- La Plata, Museum of. Rev. C. W. Currier, 636*
- Largeau, Col. Les Dinkas, 790*
- La Rue, E. C., and F. F. Henshaw. Surface Water Supply of the Great Basin, 1909, 635*
- Latimer, E. W. Russia and Turkey in the Nineteenth Century, 320*
- La Touche, T. H. D. Gen. Report on Geol. Survey of India for 1909, 225*; Lakes of the Salt Range in the Punjab,

- 225*; Mineral Production of India during 1909, 225*; Notes on Certain Glaciers in Sikkim, 225*.
- Latzina, F. Argentina studied from Physical Point of View, 395*; Trade, Past and Present, 314*.
- Laub, Lieut. W. Kaptajn Einar Mikkelssens Ekspedition, 228*.
- Launay, A. Histoire de la Mission du Thibet, *rev.*, 538.
- Launay, L. de. La Conquête minière, *rev.*, 217.
- Laurent, G. Armagnac et les pays du Gers, 718*.
- Lavalle y Garcia, J. A. Cotton Production of Peru, 715*.
- Lavenir, P. Agrology of the Argentine Republic, 395*.
- Lea, H. C. Inquisition in the Spanish Dependencies, *n.*, 947.
- Leach, W. W. Skeena R. District, 949*.
- Leachman, Capt. G. E. Map of N. E. Arabia showing routes of —, 1910, and other explorers, 392*.
- Lebeau, H. Otahiti. Au Pays de l'éternel Été, *rev.*, 379.
- Le Blond, Mrs. Aubrey (Mrs. Main). Adventures on the Roof of the World, 320*; My home in the Alps, 238*.
- Leclercq, J. Colonisation chez les Hollandais, 398*; Trip to Ararat [In Russian], 70*.
- Lecocq, A. Le Maroc occidental, 869*.
- Lecointe, G. Organisation générale de l'Institut Polaire International, 872*.
- Leener, G. de. Le commerce au Kantanga, 869*.
- Leeward Islands, Agricultural Conditions in. H. A. Tempany, 554*.
- Lefèvre, Lieut. E. Voyage au Laos, 237*; — and Nehlil. Région de Tadrata et les tribus qui l'habitent, 69*.
- Leffingwell, E. de K., in Alaska, 199; writes from Flaxman Island, 528.
- Lega, M. In Dancalia ed in Abissinia, 636*.
- Legendre, Dr. A. F. Explorations dans la Chine occidentale, 717*; Kientchang et Lototie. Chinois—Lolos—Sifans, *n.*, 376.
- Legendre, R. La pêche à marée basse, 317*.
- Legge, C. Rapport de l'exploration à la Baie Georgienne, 560*.
- Lehfeldt, R. A. Gravity in South Africa, 791*.
- Leighton, H., *joint author*, see D. H. Newland.
- Leiningen, Dr. W. Graf zu. Über Erdpyramiden, 74*.
- Leipoldt, Dr. G. Kuhnert physikalische Erdkarte in Mercators Projektion mit Darstellung der Meeresströmungen, *n.*, 235; Verkehrskarte von Mitteleuropa, *n.*, 235; see also M. Kuhnert, *joint author*.
- Lemoine, P. Les mines de plomb et de zinc en Algérie, 716*; Ressources de la France en minerais de fer, 477*.
- Leon, Captain Alonso de, *et al.* Historia de Nueva Leon, con Noticias sobre Coahuila, Tejas, y Nuevo Mexico . . . Documentos inéditos . . pub. por G. García, 480*.
- Leonard, A. G. Natural Gas in North Dakota, 474*.
- Leonard, J. W. History of the City of New York, 236*.
- Leopold II, Lac. La numération chez les Peuplades du —. M. J. Maes, 223*.
- Leroy, O. E. Slovan District, B. C., 949*.
- Levainville, J. Les ouvriers du coton dans la région de Rouen, 558*.
- Levant, Relation d'un Voyage du —, fait par ordre du Roi. [Joseph] Pitton de Tournefort, 320*. ¶ Map: Levant, Goode's Base Map, *n.*, 712.
- Levasseur, E. Les Alpes et les grandes Ascensions, 238*.
- Le Vasseur, N. Le chemin de fer de Matane et Gaspé, 715*.
- Levasseur, Pierre Émile, *Obituary*, 862.
- Leverett, F. Comparison of North American and European Glacial Deposits, 201; 317*; History of Great Lakes, 52; Outline of the History of Great Lakes, 553*.
- Lexikon, Meyers Grosses Konversations —. Sechste Aufgabe, 320*.
- Libbey, Prof. W. The Nile, 637*.
- Liberia: ¶ Boundary between Liberia and Ivory Coast, 855; Conditions in, 69*; Forschungsreise von Dr. W. Volz in das Hinterland von Liberia. Dr. R. Zeller, 154*; Notes on the only American Colony in the World. E. A. Forbes, 69*; Notizie sulla Repubblica di — Specialmente secondo i Viaggi e gli Studi di J. Büttikofer. Prof. G. Cora, 637*; Reise durch das Hinterland von Liberia in Winter 1906-7. Dr. W. Volz, 476*; Verhältnisse Liberias nach amerikanischer Auffassung, 154*.
- Library Index, Annual, 1910. Edited by W. I. Fletcher, 560*.
- Libyan Desert: Exploring — Waste in an Airship, 288; Siwah. Oase des Sonnengottes in der libyschen Wüste. J. C. E. Falls, *rev.*, 628.
- Light, Col. W. Brief Journal of Proceedings of —, with Few Remarks on some Objections made to them, 718*;

- Biographical Sketch of — the First Surveyor-General of Australia. T. Gill, 718*
- Lightning Strokes and Telephones. K. Langbeck, 920
- Lignite: A New Source of Power. G. E. Mitchell, 72*
- Limousin, Limite de la montagne dans le (Map), 878*
- Lincoln, F. C. Certain Natural Associations of Gold, 953*
- Lindgren, W. Production of Metals and Ores in 1908 and 1909, 522
- Lindsay, F. Cattle Raising in Chiriqui, 636*; Up Country in Panama, 314*
- Lindsay, J. Voyage to the Coast of Africa in 1758, 400*
- Ling, C. F. Dawn in Toda Land, *n.*, 305
- Lingley, C. R. Transition in Virginia from Colony to Commonwealth, *n.*, 295
- Linschoten, Jan Huygen van. Itinerario Voyage ofte Schipvaert van — naar oost ofte Portugaels Indien 1579-1592. Edited by Dr. H. Kern, 951*
- Lionnet, J. Chez les Français du Canada, *rev.*, 61
- Little, A. Across Yunnan, *rev.*, 210
- Livi, R. Distribuzione geografica della robustezza in Italia, 793*
- Livingston, L. S. American Book-prices Current. Record of Books, etc., sold at Auction . . 1909-10, 320*
- Lloyd, Capt. R. E. Geology of Aden Hinterland, 70*
- Lobster: Untersuchungen über den Hummer. Dr. A. Appellöf, 317*
- Loire, Haute: See Haute-Loire.
- London, Map: Bartholomew's "Quarter Inch to Mile" Contour Road Map of the Environs of, *n.*, 958
- Longe, Col. F. B. General Report on Operations of the Survey of India, 1908-09, 396*
- Long Island Sound, North Shore of, 631*; Fairfield to George's Rock, 76*, 309*; Rhineck to New Rochelle (Charts U. S. Coast and Geod. Surv.), 76*
- Longrée, F. Les îles Canaries, 791*
- Longstaff, T. G. Across the Purcell Range of British Columbia, 868*; Explorations in Eastern Karakoram (Map), *n.*, 550; Saltoro Pass, 792*; Survey of Himalaya, 396*, 638*
- López Perea, E. Territorios Españoles del Muni, 224*
- Lop-Nor Problem und seine Lösung. H. Schmitthenner, 156*; Le désert de Lop à la lumière des récentes explorations. S. Hedin, 791*
- Lorena, A. Algunos materiales para la antropología del Cuzco, 715*
- Lorentz, H. A. Expedition to the Snow Mountains of New Guinea, 718*, 952*; Map, 472*, 710*; his Explorations in Dutch New Guinea, 837
- Loreto, Peru: Mapa del Departamento de — corregido y aumentado con los estudios de los Srs. Espinar, Buenaño y otros, *n.*, 547
- Lorié, Dr. J. Het Scheldediluvium, 639*
- Lorin, H. Amérique latine d'aujourd'hui, 222*
- Lorraine française et Lorraine allemande. A. Rampal, 478*
- Lorrie, W. S. Peru's Cotton Industry, 153*
- Los Angeles Aqueduct. Carrying Water Through a Desert. B. A. Heinly, 221*
- Lötschberg Tunnel, 528, 689; Einbruch des — unter dem Gasterntal. Dr. J. Früh, 71*
- Louisiana: ¶ Oil and Gas in —, with Brief Summary of their Occurrence in Adjacent States. G. D. Harris, 66*
 ¶ Maps of Louisiana: Map of Forest Regions, 707*; Mound Quad., 75*; Production of cotton in 1909, 229*; Charts U. S. Coast and Geod. Survey: Point au Fer to Marsh Island, 631*; San Luis pass to Matagorda Bay, 631*
- Lowell, P. Evolution of Worlds, *n.*, 388
- Lualaba, Du — au Moero. E. Slosse, 950*
- Lübeck, Eine landeskundlicher Grundriss. Dr. H. Spethmann, 315*
- Lucerna, R. Anciens glaciers de la Corse et les oscillations pleistocènes de la Méditerranée, 560*; Eiszeit auf Korsika und das Verhalten der Exogenen Naturkräfte seit dem Ende der Diluvialzeit, 315*
- Lucien, Lieut. Ouadai Aouali, 556*
- Lüderitzland, Das. Dr. P. Range, 716*
- Ludewig, H. J. Kautschukkultur in Mexico, 67*
- Lukach, H. C. Bibliography of Sierra Leone, *n.*, 781
- Lumsden, Col. D. M., and N. Williamson. A journey into the Abor Country, 709*
- Lüneburg Heath: Höhenschichtenkarte der Lüneburger Heide. Dr. K. Olbricht, 226*
- Lunet de Lajonquière, Com. E. De Saïgon à Singapour par Angkor autour du Golfe de Siam, 225*

- Lupton, C. T. Eastern Part of the Bull Mountain Coal Field, Mont., 867*; — and H. Hinds. Map of N. E. part of Bull Mountain Coal Field; Map of S. E. Part of —, Montana, 630*; see also R. W. Stone, *joint author*.
- Lütgens, Dr. R. Beiträge zur Kenntnis des Quebrachogebietes in Argentinien und Paraguay, 715*
- Luzon, Charts U. S. Coast and Geod. Survey: Albay Gulf and Part of Lagonoy Gulf, East Coast of, 545; Inland Waters South of Luzon, Ragay Gulf to Tayabas Bay, 309*; Passages between — and Masbate, 158*; Southwestern — and Mindoro, 158*; West Coast of Luzon. Manila Bay to Candon Point, 309*
- Lyon, G. E. New Jersey and Forestry, 221*
- Lyons, Capt. H. G. Survey of Egypt, 67*; Valley of the Nile, 717*
- Lyons, W. J. On Distribution of Mean Annual Rainfall . . . Over Area Including Counties of Dublin, Wicklow, etc., 398*
- M.
- Maas, Dr. O. Contributions au Système des Méduses, basées sur des Formes bathy-pélagiques des campagnes scientifiques de Prince de Monaco, 317*
- McAlister, D. A., *joint author*, see C. G. Moor.
- McAter, W. L. Our Grosbeaks and their Value to Agriculture, 948*
- McCallie, S. W. Drainage Situation in Georgia, 880*
- McClintock, W. Old North Trail. or Life, Legends and Religion of Black-foot Indians, *n.*, 533
- McConnell, R. G. Portland Canal District, B. C., 949*
- McCormick, F. Vandalism in China, 56
- McCracken, L. Gubbio, Past and Present, 320*
- MacCurdy, G. G. Recent Discoveries Bearing on the Antiquity of Man in Europe, 477*
- McCutcheon, J. T. In Africa. Hunting Adventures in the Big Game Country, *n.*, 375
- Macdonell, A. In the Abruzzi, *n.*, 702
- Macdougall, Dr. D. T. Organic Response, 399*
- MacDougall (John). Forest, Lake and Prairie. Twenty Years of Frontier Life in W. Canada, 400*
- Macedonia: Die Oberfläche Mazedoniens. K. Oestreich, 227*
- Macfarlane, J. J. Commercial Venezuela. Analysis of its Export and Import Trade, 869*; Growth and Extent of Textile Industries of Philadelphia, 789*
- McFarland, R. Beyond the Height-of-Land (Labrador), 635*
- Machaček, Dr. F. Fortschritte der geographischen Forschungen in Asien im Jahre 1910, 717*; Die mineralischen Schätze der Vereinigten Staaten, 221*; Tal und Glazialstudien im unteren Eisackgebiete, 315*; Machaček's Explorations in Turkestan, 856
- Machar, A. M. The Story of Old Kingston, *n.*, 532
- McInnes, W. Report on Part of N. W. Territories drained by Winisk and Attawapiskat Rivers, 554*; Saskatchewan R. District, 949*
- Mackinder, H. J. Nations of the Modern World. Elementary Study in Geography, *n.*, 543
- McKinley Mount Region, Maps: Geol. Reconnaissance Map of. A. H. Brooks and L. M. Prindle, 795*; Reconnaissance Map of — region, 795*; Sketch Map showing distribution of timber, in, 795*
- MacLeod Falls on the Mao Kabi, French Equatorial Africa. P. A. Talbot, 637*
- MacLeod, O., and P. A. Talbot. Explorations in Lake Chad Region, 526
- Macmillan, H. Holidays on High Lands: or Rambles . . . search Alpine Plants, 238*
- McMillan, R. Cables and the Empire, 316*
- Macquarie Island and its Robinson Crusoe. Capt. J. K. Davis, 126
- MacQueen, P. Sleeping Sickness in Uganda, 181
- McQuill, T. Connecticut by Daylight, 400*
- MacRitchie, D. Kajak im nördlichen Europa, 952*
- Madagascar: ¶ Densité de la population à Madagascar. E. de Martonne, 791*; Élevage de l'autruche. Schuler, 155*; Enquête sur la valeur commerciale des produits de. Fauchère, 154*; Enseignement aux indigènes, *n.*, 149; Exploitation commerciale. Statistique des transports, 155*; Madagascar Railroad, 620; Remarques sur la géographie botanique de. Dr. B. P. G. Hochreutiner, 69*; Service maritime postal de la Côte et de Madagascar, 155*; Statistiques du Commerce . . . 1908: Madagascar et Dépendances, 556*; Statistiques de l'Industrie Minière . . . 1908, 791*; Textes relatifs aux conditions de l'agriculture sous

- l'ancien gouvernement malgache. Julien, 154* ¶ Map of Madagascar: Carte du Pays Mahafaly. Lieut. Bühner, 391*
- Madan, A. C. Living Speech in Central and South Africa, *rev.*, 925
- Madeira-Mamoré Railway. P. H. Ashmead, 636*
- Madison, Wis.: A Model City. J. Nolen, *rev.*, 625; ¶ Maps: General Plan for District of the Four Lakes, 707*; Park System of the City, 707*; Suggestive Plan for Madison, a Model City, 707*
- Madoera, Java en — Stand van de Landrente-Metingen op — (Map), 160*
- Maes, M. J. La numération chez les Peuplades du Lac Leopold II, 223*
- Magdalen Islands, Chart of, 796*
- Magellan, Ferdinand. The Discoverer of the Philippines. J. D. Champlin, 587
- Magellan, Strait of, Early Spanish Voyages to —. Introduction and Notes by Sir Clements Markham, 800*
- Magnetism: ¶ Broader Aspects of Research in Terrestrial Magnetism. Dr. L. A. Bauer, 317*; Circumnavigation Cruise of "Carnegie," for 1910-13 and Perfection of her Magnetic Work, etc. L. A. Bauer, 317*; Magnetic Surveys, Yacht Carnegie, 292; Report for 1910 of the Department of — Carnegie Institution. Dr. L. A. Bauer, 479*; Summary of Work of the Department in 1910-11. Dr. L. A. Bauer, 560*; Magnetic Character of Year 1909. G. van Dyk, 317*; Magnétisme terrestre, 479*; Physical Theory of the Earth's Magnetic and Electric Phenomena. No. IV. On Origin of Earth's Magnetism. L. A. Bauer, 720*; Proiet du Levé magnétique de l'Empire Russe et les Travaux magnétiques. M. Rykatchev, 793*; Report of Magnetic Survey of South Africa, *n.*, 926; Results of Magnetic Observations made by the Coast and Geod. Survey, 1909-10. R. L. Faris, 635*; Results of Observations made at the Coast and Geod. Magnetic Observatory at Cheltenham, Md., 1907-8. D. L. Hazard, 635*; near Honolulu. 1907-8. D. L. Hazard, 870*; at Sitka. 1907-8. D. L. Hazard, 867*; Die saecularen Aenderungen der Erdmagnetischen Elemente. Dr. H. Fritsche, 317*
- Mahan, A[lfred] T. Influence of Sea Power upon History. 1660-1783, 239*
- Maiden, J. H. Sir Joseph Banks: The "Father of Australia," *rev.*, 141
- Main, Mrs. [Mrs. Aubrey Le Blond]. My Home in the Alps, 238*; Adventures on the Roof of the World, 320*
- Maine: ¶ First Annual Report, State Water Storage Commission, 880*; Geology of Pegmatites and Associated Rocks of—including Feldspar, Quartz, etc. E. S. Bastin, 714*; Occurrence and Composition of Well Waters in the Slates of. F. G. Clapp, 553*; Results of Spirit Levelling in Maine, etc. 1896-1909. R. B. Marshall, 66*; Some Ore Deposits in — and the Milan Mine, N. H. W. H. Emmons, 313*; State Survey Commission of, 521 ¶ Maps of Maine: Distribution of Granite and Related Rocks and Locations of Quarries in Pegmatite Deposits, 389*; Ellsworth Quad., 873*; Fryeburg Quad., 873*; Kames of Maine and S. E. New Hampshire, 954*; Charts U. S. Coast and Geodetic Surv.: Mt. Desert Island, 76*; Penobscot Bay, East —, 875*; St. George River and Muscle Ridge Channel, 309*
- Main- und Saalethal, Anormale Temperaturverteilung im unterfränkischen. A. Knörzer, 71*
- Malaga Santolalla, F. Departamento de Cajamarca, 790* — and C. Vallejos Z. Map of Cajamarca, 547*
- Malay Archipelago. See also Sunda Islands: ¶ Eigenaardige Gebruiken Bij Pokken-Epidemieën in den Indischen Archipel. F. D. E. van Ossenburg, 557*; Elementare Theorie der Gezeiten; nebst den Gezeitenkonstanten der wichtigsten Orte des Indischen Archipels und anderer Hafenplätze. J. P. van der Stok, 953* ¶ Map of Malay Archipelago: Linien gleicher Gezeitenphase im Ostindischen Archipel. Dr. J. P. van der Stok, 798*
- Malay Peninsula: ¶ De Saigon à Singapour, par Angkor, autour du Golfe de Siam. Com. E. Lunet de Lajonquière, 225*; Traveller's Notes, or, Notes of a Tour through India, Malaysia, etc., 1891-93. J. H. Veitch, 240*
- Malay States, The Federated Protected: ¶ Chemin de fer de Bangkok à la Malaisie Britannique, 156*; Ceylon, — and Java compared as Plantation and Residential Colonies. J. Ferguson, 638*; Illustrated Guide to the Federated Malay States, *rev.*, 697; A Propos de la deuxième session du Conseil fédéral des États malais. [Summary of Development]. Comm. E. de Lajonquière, 638*
- Malayo-Polynesians: Grundlinien einer Vergleichung der Religionen und

- Mythologien der austronesischen Völker. P. W. Schmidt, 72*
- Maler, T. Explorations in the Department of Peten, Guatemala, 949*
- Mallet, E. Exploration de la rivière N'Goindé, 476*
- Mallet, G. Lettres sur la Route de Genève à Milan par le Simplon écrite en 1809, rome éd., 238*
- Malta, Tre giorni a —. Ant. M. Annoni, 398*
- Mammals, The Age of — in Europe, Asia and North America. H. F. Osborn, *rev.*, 541
- Mamontov, V. N. *Altai'skii Meteorit 1904 goda* [Altai Meteorite], 74*
- Manchuria: ¶ Ferrovie della Manciuuria e l'Accordo Russo-Giapponese. E. Catellani, 224* ¶ Maps of Manchuria: Distribution of Iron Ore in, 877*; Postkarte der Mandschurei. Dr. R. Pösch, 472*; Sketch Map of China and —, 877*
- Mandar, Breukenkust van. E. C. Abendanon, 637*
- Mangin, Mission du Colonel — 1910, 223*
- Manila: ¶ Monthly Bulletin, Weather Bureau, for 1909, 225*; Study of Manila Copal. P. C. Freer, 225* ¶ Charts U. S. Coast and Geod. Surv.: Manila Bay, 158*, 309*
- Manipur, The Naga Tribes of. T. C. Hodson, *rev.*, 698
- Manitoba, Maps: ¶ Index Map to Townships, etc., *n.*, 390; Index to Townships in —, etc., 230*; Cereal Maps of —, etc., *n.*, 159
- Manley, R. True Description of the Mighty Kingdoms of Japan and Siam. Written Originally in Dutch by F. Caron and Joost Schorten, etc., 237*
- Mann, O. Stand der geologischen Erforschung des Schutzgebietes Kamerun (Map), 956*
- Mannheim, Hafen von. Dr. W. Götzinger, 871*
- Manniche, A. L. V. Terrestrial Mammals and Birds of Northeast Greenland, 59
- Manning, Dr. R. La Guaira the picturesque, 153*
- Manning, S. Swiss Pictures. Drawn with Pen and Pencil, 238*
- Mansfield, Prof. G. R. Origin of Cliff Lake, Mont., 553*
- Mantero, F. Manual Labour in S. Thomé and Principe, *rev.*, 535
- Maps. See also Atlases, Charts and Cartography: ¶ Colouring of Relief Maps, 639*, 779; Goode's Base Maps, *n.*, 712; Höhenschichtenkarten. Studien und Kritiken zur Lösung des Flugkartenproblems. Dr. K. Peucker, *rev.*, 465 ¶ International Map of the World, 317*, Argentina, Brazil and Chile . . . Share in Preparation of, 59 ¶ Isogonenkarte in besonderer Projektion. Dr. H. Maurer, 799*; Neue Studien über Isochronenkarten. J. Riedel, 953*; Kuhnert physikalische Erdkarte in Mercators Projektion mit Darstellung der Meeresströmungen Bearb. von Dr. G. Leipoldt, *n.*, 235*; Maps and Map-Making. E. A. Reeves, *rev.*, 213; Maps of Primitive Peoples. B. F. Adler. [In Russian.] *Resumé in English*, 669 ¶ Map Study in Schools. W. M. Gregory, 452, School Wall Maps, *n.*, 80, How to Use Contour Handmaps for Class Teaching. J. A. White, *n.*, 946 ¶ Maps for Aeronauts, 203, Maps for Airships. C. Lallemand, 922 ¶ Tables for Projection of Graticules for Maps on the scale of 1:1,000,000, *n.*, 220 ¶ Historical Maps: Fac-similé de la Figure III de la Carte générale du cours du Gange et du Gagra . . . en 1784; — Figure VI de la Carte générale, 879*; Historische Karte von Zeeland nach Utrecht Dresselhuys, 711*; Persistence of Idea of North America as Group of Islands (1502-1622), 799*; Map of Twenty-two Spanish and American Trails and Routes Affecting California, 1694-1849, 799*; Pianta d'Imola. Leonardo da Vinci (Facsimile of a MS.), 799*; Routes of Galleons in the Pacific as Noted in their Log Books, 799*
- Maps, New:
- America, 75, 157, 228, 308, 389, 470, 544, 629, 706, 794, 873, 953
 - Africa, 78, 159, 231, 310, 391, 471, 547, 707, 797, 876, 955
 - Asia, 79, 160, 231, 310, 392, 472, 548, 708, 797, 877, 956
 - Australasia and Oceania, 232, 310, 473, 710, 798, 878, 957
 - Europe, 79, 233, 311, 392, 473, 551, 710, 798, 878, 957
 - Polar Regions, 80, 234, 312, 393, 712
 - World, 80, 473, 552, 879, 959
 - Cartographical, 799, 960
 - Educational, 712, 799, 879
 - Historical, 799, 879
 - Oceanographical, 234, 798, 879
 - School Wall Maps and Atlases, 80, 235, 713
 - General, 473, 713
- Marbut, Prof. C. F. Soils of Ozark Regions, 366
- Marchgebiet. Niederschlag, Abfluss und

- Verdunstung im. Dr. E. Stummer, 397*
- Marckwald, Dr. E., and Dr. F. Frank. Kautschuk-Plantagenbau in seiner Bedeutung und seiner Gefahren für die deutsche Kolonialwirtschaft, 639*
- Marconi, Comm. G. Transatlantic Wireless Telegraphy, 640*
- Marchand, H. États-Unis et les Philippines, 948*; Les musulmans de l'Inde et le nationalisme hindou, 638*
- Mare Is. Strait, Cal., Chart U. S. Coast and Geod. Surv., 631*
- Marek, Dr. R. Waldgrenzkarte der österreichischen Alpen, *n.*, 710
- Margerie, E. de. Étude du profil en long des cours d'eau français, 71*
- Marinelli, Prof. O. Variations périodiques des glaciers. Alpes italiennes, 478*
- Markham, Sir Clements R. Land of the Incas, 153*; Preface and Introduction to Early Spanish Voyages to the Strait of Magellan, 800*
- Marks, E. O. Coal Measures of South East Moreton, 557*
- Marquardsen, H. Oberflächengestaltung und Hydrographie des saharisch-sudanischen abflusslosen Gebietes, 556*
- Marquesas Islands: ¶ Eastern Pacific Lands: Tahiti and —. F. W. Christian, *rev.*, 380; Trois Archipels de la Polynésie orientale. Samoa; Îles sous le Vent; Marquises. R. La Bruyère, 638*
- Marshall, P. Glaciation of New Zealand, 70*
- Marshall, R. B. Results of Spirit Levelling in Alabama, Georgia, and Other States, 1896-1909, 66, 313, 635, 789, 876, 948*; — and A. H. Sylvester. Administrative Map Yosemite National Park, *n.*, 77
- Martin, C. Congo Belge, 223*; La navigation sur le Congo et le Stanley Pool, 716*
- Martin, E. S. Further Experiments on Dew-Ponds, 317*
- Martin, G. C., C. W. Washburne and Others. Investigations of Coal Fields in Colorado and New Mexico, 151*
- Martin, L. Alaskan Earthquakes of 1899, 151*; Geographical Influences in Alaska, 313*; National Geogr. Soc. Researches in Alaska, 948*; Progressive Development of Resources in the Lake Superior Region, 561, 659; see also W. C. Phalen, *joint author.*
- Martinique: Statistiques du Commerce . . . pour 1908, 789*
- Martiny, Dr. R. Kulturgeographische Wanderungen im Koblenzer Verkehrsgebiet, *n.*, 785
- Martonne, Ed. de. La densité de la population à Madagascar, 791*; Érosion glaciaire et la formation des vallées alpines, 558*; Évolution du Relief de l'Asie centrale, 557*; Sur la position systématique de la chaîne des Karpates, 71*
- Martrou, L. Le Nomadisme des "Fangs", 314*
- Maryland: ¶ Maryland under Commonwealth. Chronicle of the Year 1649-1658. B. C. Steiner, 867*; — Weather Service, *rev.*, 693; Results of Spirit Levelling, 1896-1909. R. B. Marshall, 66* ¶ Maps of Maryland: Anne Arundel Co., Soil Survey, 77*; Antietam Quad., 75*; Emmetsburg and Prince Frederick Quadrangles, 629*; Distribution of Granite Quarries and Granites, 76*; Floristic Zones and Ecological Districts, 77*; Map showing limestones of, 77*; Maps showing relative valuation of farm buildings; relative production of corn, wheat, tobacco, hay and milk; acreage in canning crops, 77*; Plan boundary Lines between . . . Maryland and three lower counties of Delaware with part . . . boundary between — and Penn. Facsimile of Map by C. Mason and Dixon, 77*; Sketch Map showing oil and gas fields, location of quadrangles and nature of geol. reports, 874*
- Masai, Die. Ethnographische Monographie eines ostafrikanischen Semitenvolkes. M. Merker, *rev.*, 928 ¶ Map: Allgemeine Übersichtsskizze der Wohngebiete des, 956*
- Masbate, Passages between Luzon and —, Chart U. S. Coast and Geod. Surv., 158*
- Mason, C., and J. Dixon. Facsimile of Parchment Map prepared by — Plan of Boundary lines between Maryland and three Lower Counties of Delaware, etc., 77*
- Mason, J. A. Myths of the Utah Utes, 221*
- Massachusetts: ¶ Description of Eastern Coast of the Country of Barnstable from Cape Cod to Cape Malebarre, etc., (Ja. (?) Treeman), 560*; Present Forest Problems of. A. Chamberlain, 948*; Reforestation of. F. W. Rane, 789*; Proceedings of Mass. Historical Society, Vol. XLIII, 236* ¶ Maps of Massachusetts: Map showing Quarrying Centers, 874*; Charts U. S. Coast and Geod. Surv.: Cape Cod Bay, 76*; Newburyport Harbor, 309*; Harbors of Plymouth, Kingston

- and Duxbury, 875*; Provincetown Harbor, 875*
- Massart, J. Esquisse de géographie botanique de la Belgique, *n.*, 144
- Massman, P. L. Mission an den Staatsposten von Belgisch-Kongo, 153*
- Masterman, E. W. G. Studies in Galilee, *rev.*, 209
- Masuren, West. Dr. C. Kob, *n.*, 144
- Matadi: Matadi-Leopoldville R. R., 620; Le Transafricain de — à Dar-es-Salaam. A. J. Wauters, 716*
- Matavanu in Savaii, Ascent of. T. Anderson, 225*
- Mather, Cotton, Diary of — 1681-1708. (W. C. Ford, *editor*), 560*
- Mathews, J. L. Conservation of Water, *rev.*, 306
- Mathews, R. H. Further Notes on Burial Customs, Australia, 156*
- Matthes, F. E., Personal, 529
- Matthews, L. K. Expansion of New England; Spread of Settlements and Institutions to the Mississippi River, 1620-1865, *rev.*, 531
- Matto Grosso: ¶ Le Matto-Grosso (Brésil), 223*; Reisen in — und Paraguay. C. Carnier, 869*
- Mattos, J. N. B. Dados climatológicos do Verão de 1908, 223*; Dados climatológicos do Anno 1909 (São Paulo), 790*
- Maudit, F. Cultivation of Trees in Argentina, 314*
- Maui Island, Kahului Harbor and Approaches, Chart U. S. Coast and Geod. Surv., 76*
- Maull, O. Grenzgürtel der nördlichen Kalkalpen, 397*
- Maurer, Dr. H. Gegen-azimutale winkeltreue Projektion, *n.*, 552; Isogonenkarte in besonderer Projektion, 799*; Kurze Charakteristik des Klimas der deutschen Schutzgebiete, 639*
- Mauritania: ¶ Du Guir à la Mauritanie. Le capitaine Doury, 476*; Pacification de la —. Col. Gouraud, 69*
 ¶ Maps of Mauritania: Région des puits d'Agamoun et des salines de N'Térert et Touidermi, 876*; Région des salines du Trarza occidentale, 876*
- Mauritius: Sugar Industry of (Cyclones, Sugar Cane and Insurance. A. Walter), 918 ¶ Map of Mauritius: Carte de l'île Maurice, 876*
- [Mawman, Joseph]. Picturesque Tour through France, Switzerland, etc., in 1816, 238*
- Mawson, Dr. D. Australasian Antarctic Expedition, 872*; —'s Antarctic Plans, 270, 921; South Polar Regions. With Antarctic Continent drawn to illustrate the probable topography as deduced from present available data; Supposed Antarctic Continent (Maps), *n.*, 712
- Mayr, Dr. H. Morphologie des Böhmerwaldes, 46, 397*
- Mazauric, F. Recherches spéléologiques dans le Département du Gard, 1904-9, 315*
- [Mazuchelli, N. E.] Indian Alps and How We Crossed Them. By a Lady Pioneer, 237*
- Mazzolani, D. A. Provincia dello Junnan, 637*
- Mecking, L. Über die ozeanographischen Ergebnisse der Ausreise . . . Planet, 317*
- Mecklenburg, Duke Adolphus Frederick of. In the Heart of Africa, *rev.*, 863; his Expedition in Africa, 855
- Mediterranean Regions: ¶ Anciens glaciers de la Corse et les oscillations pleistocènes de la Méditerranée. R. Lucerna, 560*; Beiträge zur Kenntnis der Höhengrenzen der Vegetation im Mittelmeergebiete. Dr. M. Koch, *n.*, 933; Classic Mediterranean. J. B. Devins, *n.*, 540
- Mediterranean Sea: ¶ Die dänische ozeanographische Expedition nach dem Mittelmeere, 1908-9. N. Mey, 228*; Sur les températures des grandes profondeurs particulièrement dans la Méditerranée. J. N. Nielsen, 794*
 ¶ Map of the Mediterranean: Campagne scientifique de la Princesse Alice, 234*
- Meinhard, F. Durch das Strumadefilee nach der bulgarischen Thermenstadt Küstendil, 315*
- Meinzer, O. E. Map of Southern Minnesota showing Occurrence of Granitic Rocks and Sioux Quartzite, 706*; Preliminary Report on Ground Waters of Estancia Valley, N. M., 221*; Topographic Map of Minnesota, 706; see also C. W. Hall, *joint author*.
- Mélia, G. Tabacs en Algérie, 69*
- Melland, F. H. Sketch Map of Southeast Corner of Bangweulu Swamps inhabited by Wa-Unga showing channels connecting Chambeshi and Luapula Rivers, 956*
- Mellish, H. The Present Position of British Climatology, 719*
- Melo, R. Navegación en el Peru, 715*
- Mercadier, Lieut. M. De l'Atlantique au Tchad et au Borkou, 476*
- Mercalli, Prof. G. I Danni prodotti dai terremoti nella Basilicata e nelle Calabrie, *n.*, 145
- Mercantetti, Capt. N. Method for De-

- termining the Position of Vessel in Sight of Fixed Point, 470*
- Mercanton, Prof. P. L. *État actuel des études glaciaires*, 74*
- Merchier, A. *Colonies anglaises d'Afrique*, 68*
- Meredith, F. C. (*editor and compiler*). *Iti Dalan Ti Santa Nga Kruz* (The Way of the Holy Cross), 880*
- Merker, M. *Die Masai. Ethnographische Monographie eines ostafrikanischen Semitenvolkes*, *rev.*, 928
- Merlin, Gov.-Gen. *Situation générale de l'Afrique Equatoriale Française*, 154*
- Merriam, C. H., V. Bailey, and Others. *U. S. Biol. Surv. Fourth Provisional Zone Map of North America*, 707*
- Merriam, J. C. *Tertiary Mammal Beds of Virgin Valley and Thousand Creek in N. W. Nevada*, 313*
- Merzbacher, Dr. G. *Meine letzte Tianschan-Expedition, 1907-8*, 397*; *Über Verlauf und Ergebnisse meiner neuen Forschungsreise in*, 397*; *Wiss. Erg. Merzbacherschen Exp.* P. Gröber, *n.*, 66
- Mesopotamia: ¶ *Die künstliche Bewässerung Babyloniens*. K. Ch. Christiansen, 155*; *Meine Expedition durch Vorder-Asien*. Dr. H. Grothe, 870*; *Reisebilder aus Mesopotamien und Kurdistan*. Dr. H. Frh. v. Handel-Mazzetti, 557* ¶ *Maps of Mesopotamia*: Ewald Banse's *Reise im nördl. Mesopotamien*. 1908, *n.*, 310; *Studie zu Dr. V. Pietschmanns photographischen Aufnahmen in*. I. Tschamler, *n.*, 960
- Messina: *Catastrofe sismica Calabro Messinese*. M. Baratta, *n.*, 145
- Meteorites: ¶ *Abundance of Meteorites on Painted Desert, and its Bearing upon the Planetesimal Hypothesis of the Origin of the Earth*. C. R. Keyes, 560*; *Altai Meteorite, 1904*. [In Russian.] V. N. Mamontov, 74*; *An Australian*. —. L. L. Smith, 156*; *Meteorite Studies*. O. C. Farrington, 318*
- Meteorology. See also Atmosphere, Temperature, Climate, etc.: ¶ *Brief List of Meteorological Text-Books and Reference Books*. C. F. Talman, *n.*, 220; *Centers of Action and Seasonal Weather*, 371; *Descriptive Meteorology*. W. L. Moore, *rev.*, 386; — at the Intern. Amer. Scien. Congress, Buenos Aires. R. C. Mossman, 317*; *Instruction in*. F. V. Emerson, 452; *Meteorbeobachtungen auf See*. Dr. J. Plassmann, 794*; *Météorologie*, 479*; *Meteorology Practical and Applied*. Sir John Moore, Sec. Ed., *rev.*, 465; *Origin of Permanent Ocean Highs*. W. J. Humphreys, 953; *Registering Balloon Ascents*, Dec., 6-11, 1909 and Aug. 8-13, 1910. W. H. Dines, 640*; *Status of Modern*. —. F. H. Bigelow, 399* ¶ *Meteorological Map*: Map showing positions of meteorological stations [Europe] observations from which are used in preparation of [United Kingdom] daily Weather reports, *n.*, 80; 958*
- Mettrier, H. *Le Col du Pelvoux*, 71*
- Meuleman, Prof. *Bericht über die wichtigsten Faktoren der Akklimatisation europäischen Viehes in warmen Ländern*, 399*; *Facteurs essentiels de l'acclimatement du bétail européen dans les pays chauds*, 479*
- Meunier, A. *Carte de la Côte Française des Somalis et Régions avoisinantes*, *n.*, 797
- Mexico, General: ¶ *Album Pintoresco de la Republica Mexicana*, 400*; *Barbarous Mexico*. J. K. Turner, *rev.*, 140; *Determinaciones magneticas en la Republica*, 152*; *Notes on Southern*. —. G. N. Collins and C. B. Doyle, 635*; *Our Neighbor*. —. J. Birkinbine, 868*; *Œuvre géographique d'Alexandre de Humboldt*. E. Oberhummer, 636*; *Studies of Mexican and Central American Plants*. J. N. Rose, 636*; *Terremotos del Año de 1908*. M. Miranda y Marrón, 152* ¶ *Economic: Agricultural Possibilities in tropical*. —. Dr. P. O. Seffer, 395*; *Boletín de Estadística Fiscal, 1909-10*, 475*; *Histoire de la cochenille au Mexique*. L. Diguët, 554*; *Kautschukkultur in*. H. J. Ludwig, 67*; *Population of*, 620 ¶ *Historical: Carácter de la Conquista Española en América y en México, según los textos de los Historiadores Primitivos*. G. García, 480*; *Historia Verdadera de la Conquista de la Nueva España por Bernal Díaz del Castillo uno de sus Conquistadores*. G. García, 480*; *Life and Times of Miguel Hidalgo y Castilla*. A. H. Noll, *rev.*, 374; *Mexico durante su guerra con los Estados Unidos*. José Fernando Ramírez. *Documentos inéditos* . . . pub. por G. García, 480*; *Notes sur la Médecine et la Botanique des anciens Mexicains*. A. Gerste, 395*; *Spanish Conquest in — and its Relation to History of Slavery, etc.* A. Helps, 318*; *Tumultos y Rebeliones*

- Acácidos en México. Documentos inéditos pub. por G. García, 480*; Su virreinato en la Nueva España, etc. Don Juan de Palafox y Mendoza. Documentos inéditos . . . pub. por G. García, 480* ¶ Maps of Mexico: Carta de la región abarcada por el temblor del 26 de Marzo de 1908. J. F. Romani, 159*; Croquis geológico y topográfico del Valle de Ixmiquilpan, 231*; Linguistic Map of Mexico and Central America. (Bur. of Amer. Ethnol. Map.) C. Thomas and J. R. Swanton, 706*; Map of —. J. G. Bartholomew, *n.*, 634*; Meteorological Maps of, *n.*, 876
- Mey, Dr. N. Die dänische ozeanographische Expedition nach dem Mittelmeere, 1908-9, 228*; Passatwinde des Atlantischen Ozeans, 640*
- Meyer, Dr. G. Geographische Verbreitung der Schlafkrankheit, 318*
- Meyer, Dr. H., His Donation for Professorship of Colonial Geography, 60; Returns to German East Africa, 288, 526
- Meyers Grosses Konversations-Lexikon, Sechste Aufgabe, 320*
- Michaelsen, Dr. H. Kalkpfannen des östlichen Damaralandes, 154*
- Michaux, André, Voyage d' — en Syrie et en Perse (1782-85) d'après son journal et sa correspondance. Dr. E. T. Hamy, 870*
- Michel, G. Maps accompanying "Coudes de Capture" du pays fribourgeois, 959*
- Michie, A. Siberian Overland Route from Peking to Petersburg, etc., 237*
- Michieli, A. Jean Brunhes e l'opera sua, 639*
- Michigan: ¶ Establishment of —'s Boundaries: Study in Historical Geography. G. J. Miller, 339; Michigan and Its Resources. Compiled by F. Morley, 236*; Results of Spirit Leveling in — and Wisconsin, 1897-1909. R. B. Marshall, 789* ¶ Maps of Michigan: Calumet Special Map, 629*; Fowlerville Quad., 75*
- Michow, H. Zur Geschichte der Bekanntschaft mit Sibirien vor Jermak, 224*
- Mielert, F. Insel Korsika, 315*
- Mikkelsen, Kaptajn Einar —'s Ekspedition. Lieut. W. Laub, 228*
- Miles, A. H. Agricultural Labour Conditions in Jamaica, 475*
- Miles, Lieut.-Col. S. B. On Border of Great Desert: Journey in Oman, 70*
- Milford, J. J. Observations, Moral, Literary and Antiquarian . . . Pyre-
nees, South of France, etc., 1814-15, 238*
- Mill, Dr. H. R. British Rainfall, 1908-1909, *rev.*, 539; *British Isles. Mean Annual Rainfall* (Map), *n.*, 551; Guide to Geographical Books and Appliances, *n.*, 942
- Mill, Lieut.-Col. H. La mise en valeur du Territoire du Tchad, 223*
- Miller, B. L. Mineral Paints, 789*
- Miller, G. J. Establishment of Michigan's Boundaries: Study in Historical Geography, 339
- Mills, J. C. Our Inland Seas, *rev.*, 139
- Milne, J. Recent Earthquakes, 640*
- Milne, Mrs. L. Shans at Home, *rev.*, 864
- Minas Geraes: Map of Bagagem Valley, 955*
- Mindoro, Southwestern Luzon and —, Chart U. S. Coast and Geod. Surv., 158*
- Minerals: La Conquête minérale. L. de Launay, *rev.*, 217; Recognition of Minerals. C. G. Moor and D. A. McAlister, *rev.*, 149
- Minervaa*, 1910-1911, 480*
- Minnesota: ¶ Prairie Flora of Southwestern —. L. R. Moyer, 714*; Prevention of Forest Fires in. Gen. C. C. Andrews, 474*; Results of Spirit Leveling, 1897 to 1910. R. B. Marshall, 635* ¶ Maps of Minnesota: Barrett and Herman Quadrangles, 389*; Map showing stages of recession in the ice in, 954*; Maps of southern — showing Occurrence of Granitic Rocks and Sioux Quartzite. O. E. Meinzer, 706*; Thickness and Character of Surface Deposits. C. W. Hall, O. E. Meinzer and M. L. Fuller, 706; Underground Water Conditions. C. W. Hall, O. E. Meinzer and M. L. Fuller, 706*; Topographic Map of Southern —. O. E. Meinzer, 706
- Minnesota R. Drainage Basin. R. Follansbee, A. H. Horton and R. H. Bolster, 867*
- Minnewanka Lake Section. H. W. Shimer, 949*
- Miranda y Marrón, M. Los Terremotos del Año de 1908 [Mexico], 152*
- Mississippi: ¶ Cement and Portland Cement Materials of. A. F. Crider, 880* ¶ Maps of Mississippi: Coahoma, Dundee, Jonestown, and Walnut Lake Quadrangles, 75*; Map showing production of cotton in 1909, 229*; Soil Survey Map of Clay Co., 229*

- Mississippi R. Drainage Basin, Upper. R. A. Follansbee, A. H. Horton and R. H. Bolster, 789*; Rhine and — Terminals. E. J. Clapp, 714*; World's Great Rivers. The Mississippi. R. M. Brown, 474*
- Misson, L. L'élevage dans l'État de São Paulo, 950*
- Missouri: ¶ Antiquities of Central and S. E. —. G. Fowke, 474*; Geology and Mineral Resources of St. Louis Quadrangle. N. M. Fennerman, 788*; Results of Spirit Leveling, 1886 to 1909. R. B. Marshall, 867* ¶ Maps of Missouri: Archaeological Sites in. G. Fowke, 158*; Atchison Co. Soil Survey, 77*; Geol. Map of the St. Louis Quad., 544; Higdon and Macon Quadrangles, 75*; Leavenworth Quad., 75*
- Missouri River and Its Future Importance to the Nations of Europe. L. A. Owen, 948*
- Mississini, Région de. E. Rouillard, 152*
- Mitchell, G. E. American Potash Industry, 789*; New Source of Power [Lignite], 72*; Our Greatest Plant Food [Phosphates], 317*
- Mitteilungen des Sächsisch-Thüringischen Vereins für Erdkunde zu Halle, 227*
- Mobile River Drainage Basin, 394*
- Modena, Map, *n.*, 311
- Moffit, F. H. Mining in Chitina District, 394*; — and S. R. Capps. Geol. Map of Nizina District, Alaska, 874*
- Mogador, le dernier Port ouvert du Maroc sur l'Atlantique. J. du Taillis, 790*
- Moisel, M., *joint author*, see P. Sprigade.
- Moldenke, R. Coke Industry of the U. S., 221*
- Molengraaff, Dr. G. A. F. Gold-industrie in Surinam, 223*
- Moll, Col., Les Événements du Ouadaï et la Mort du —. R. de Caix, 224*
- Moluccas, Map of Amboina and the —, 472*
- Monaco, Prince Albert 1^{er} de. Sur la dixième campagne de la Princesse-Alice II, 399*; — douzième —, 872*
- Monagas, Venezuela, Centros Pecuarios del Estado — (Map), 876*
- Mongolia: ¶ Explorations in. D. Caruthers, 396*; Mongolia-Sze-Chuan Exp. of Imp. Russian Geog. Soc. Col. P. K. Kozlov, 396*; Spedizione nella Mongolia e nel Secucan. P. Kozlov, 951*; Aux Ortos. P. A. Boty, *n.*, 64; Tramps in Dark Mongolia. J. Hedley, *rev.*, 209 ¶ Map of Mongolia: Mongolie. Atlas Universel de Géographie. V. de Saint-Martin et Fr. Schrader, *n.*, 312
- Monod, Th. Des facteurs de l'acclimatation du bétail européen en Algérie et dans les pays chauds, 314*
- Monongahela Basin, Denudation and Erosion in Southern Appalachian Region and —. L. C. Glenn, 635*
- Monroe, W. S. Bohemia and the Čechs, *n.*, 144
- Montana: ¶ General Part of Bull Mountain Coal Field. R. W. Richards, 221*; Eastern Part of the. C. T. Lupton, 867*; Fort Peck Indian Reservation Lignite Field. C. D. Smith, 221*; Glacier National Park, 366; Graphite near Dillon. A. N. Winchell, 867*; Milk R. Coal Field. L. J. Pepperberg, 221*; Notes on Coals of the Custer National Forest. C. H. Wegemann, 222*; Origin of Cliff Lake. Prof. G. R. Mansfield, 553*; Phosphates in. H. S. Gale, 313*; White Pines of — and Idaho.—Their Distribution, Quality and Uses. F. I. Rockwell, 867* ¶ Maps of Montana: Map of Northeastern Part of Bull Mountain Coal Field. C. T. Lupton and H. Hinds, 630*; Reconnaissance Geol. Map of Elkhorn Mts., 874*; Sheridan Quad., 874*
- Montauk Point to New York and Long Island Sound, Chart U. S. Coast and Geod. Surv., 309*
- Mont Blanc: ¶ Description des Aspects du —. . . Présenté à Sa Majesté le Roi de Sardaigne. M. T. Bourrit, 320*; Some Climbs on the South Side of. H. O. Jones, 793*; Jacques Balmat, or, The First Ascent of —. A True Story, T. L. Oxley, 239* ¶ Map of Mont Blanc: Carte Albert Barbey. La chaîne du Mont-Blanc. X. Imfeld et L. Kurz, *n.*, 551
- Montenegro: ¶ Au Montenegro et en Albanie. Baron J. de Witte, 315*; Die räumliche Entwicklung Montenegros. Dr. K. Hassert, 315*; Wanderung durch das östliche Bosnien, — und Albien. L. Edlinger, 477* ¶ Map of Montenegro: Monténégro, 959*
- Montreal R. District. W. H. Collins, 948*
- Moon: Erdbild in Mondentfernung. W. Krebs, 953*
- Moor, C. G., and D. A. McAlister. Recognition of Minerals, *rev.*, 149
- Moore, Sir John. Meteorology Practical and Applied, Sec. Ed., *rev.*, 465
- Moore, W. L. Descriptive Meteorology, *rev.*, 386

- Moravia: ¶ Niederschlag, Abfluss und Verdunstung im Marchgebiete. Dr. E. Stummer, 397*
- Moret-sur-Loing, Dunes continentales de — front oriental de la forêt de Fontainebleau. C. Duffart et F. Bergeron, 718*
- Morin, D. Monographie de la commune de Saint-Palais-sur-Mer, 871*
- Morrisseau, Comm. J. Sur les hauteurs du Katanga du lac Moero à Lukafu, *n.*, 695
- Moritz, Prof. Dr. E. Reisestudien aus Südwest-Afrika, 791*; Tirashochfläche, 396*
- Morley, F. Michigan and its Resources, 236*
- Morley, S. G. Ancient Temples and Cities of the New World. Uxmal the City of Xius, 635*; Copan, the Mother City of the Mayas, 789*
- Morocco: ¶ Amalat d'Oujda. Étude de géographie physique. L. Gentil, 790*; Commerce extérieur du Maroc. L. Gentil, 790*; Derniers développements de l'affaire marocaine. R. de Caix, 951*; Étude d'une zone frontière. Confins algéro-marocains. E. Bernard, 790*; Journal du corps de débarquement de Casablanca à travers la Chaouïa. Capt. Grasset, 866*; Une leçon de géographie physique sur le Maroc. L. Gentil, 476*; Maroc Occidental. A. Lecocq, 869*; With Mulai Hafid at Fez. Behind the Scenes in. L. Harris, *rev.*, 459; Mysterious — and how to Appreciate It. H. J. B. Ward, *n.*, 304; Notes sur le Haut Ziz. M. Oustry, 476*; Notes sur l'oued Gheris et ses affluents. M. Bernard, 476*; L'œuvre française dans les Confins Algéro-Marocains et ses Résultats politiques. A. Bernard, 223*; Œuvre de la Mission hydrographique du Maroc. H. Froidevaux, 790*; Quelques rectifications à la carte du Maroc. Vallée de la Moulouya. A. Bernard, 556*; Région de Tafrata et les tribus qui l'habitent. Lieut. Lefèvre and Nehlil, 69*; Relation de l'Origine et Succès des Cherifs et de l'État des Royavmes de Maroc, Fez, et Tardant, etc. Faicte & écrite en Espagnol par Diego de Torrès. Mise en François par M. C. D. V. D. D. A. (1636), 480*; Résumé de nos rapports avec les représentants du Maghzen et les populations de la zone frontière orano-marocaine. Capt. Mougin, 476*; Situation économique du Maroc, 1908-9. René-Leclerc, 476* ¶ Maps of Morocco: Deutsche Ansprüche an Marokko, 877*; Frontière Orano-Marocaine septentrionale, 708*; Atlas Univ. de Géog. V. de Saint-Martin et Fr. Schrader, *n.*, 312; Maroc au 500,000^e, État d'avancement des travaux, 1909, 708*; Région de Casablanca, *n.*, 391; Zone de 10 Kilomètres autour de Tétouan, 472*; Zones pacifiées de 1903 à 1910, 707*
- Morphology: Méthode de l'échantillonnage topographique au service de la morphologie. Prof. J. Brunhes, 74*
- Morrill, W. J. Fixation of Dunes on the Coast of Jutland, 718*
- Morris, C. Industrial and Commercial Geography, *rev.*, 385
- Morris, M. O'Connor. Rambles in Rocky Mts., 400*
- Moselgebiet, Morphologie des — zwischen Trier und Alf. Dr. B. Dietrich, 478*
- Mosi-Oa-Tunga, Wonders of: The Falls of the Zambezi. L. L. Seaman, 951*
- Mossman, R. C. Interdiurnal Variability of Temperature in Antarctic and Sub-Antarctic Regions, 58; Meteorology in Weddell Quadrant during 1909, 72*; Meteorology at Intern. Amer. Scient. Congress, Buenos Aires, 1910, 317*; Present Position of Antarctic Meteorology, 228*
- Moszkowski, M. Vorläufiger Bericht über die Deutsche Mamberamo-Exped. in Nied.-Neu-Guinea, 557*
- Mougin, Capitaine. Résumé de nos rapports avec les représentants du Maghzen et les populations de la zone frontière orano-marocaine, 476*
- Mountaineering: ¶ Adventures on the Roof of the World. Mrs. Aubrey Le Blond, 320*; Ascensions nouvelles dans le Dauphiné. E. Santi, 793*; Alpinisme sans guide. E. Canzio, 318*; Les Alpes et les grandes ascensions. E. Levasseur, 238*; British Mountain Climbs. G. D. Abraham, *n.*, 701; The Call of the Snowy Hisspar. W. H. Hunter, *rev.*, 929; Some Climbs on the South Side of Mont Blanc. H. O. Jones, 793*; Hochtouren in den Alpen, Spanien, Nordafrika, Kalifornien und Mexico. R. Schäfer, 320*; Swiss Mountain Climbs. G. D. Abraham, *n.*, 701; Jahrbuch des Schweizer Alpenclub, 1910-11, 880*; Jacques Balmat, *or*, The First Ascent of Mont Blanc. A True Story. T. L. Oxley, 239*; Klubhütten des Schweizer Alpen-Club, 880*; Register of the Appalachian Mountain Club for 1911, 789*

- Mountain Passes: ¶ Studien über Gebirgspässe mit besonderer Berücksichtigung der Ostalpen. Dr. J. Sölch, 602
- Mountain Pastures: ¶ Surcharge des pâturages et l'aménagement des montagnes. P. Descombes, 72*
- Mountains: ¶ Bergzeichnung auf den älteren Karten. J. Röger, 480*; Les Montagnes. A. Dupaigne, 239*; The Story of the Hills. Popular Account of the Mountains and How They were Made. H. N. Hutchinson, 239*
- Mount Desert Island. Frenchman's and Blue Hill Bays, Chart U. S. Coast and Geod. Surv., 76*
- Mount McKinley Region, Maps: ¶ Geol. Reconnaissance Map of region. A. H. Brooks and L. M. Prindle, 795*; Reconnaissance Map of, 795*; Sketch Map showing Distribution of Timber, 795*
- Mount Robson, Attempt on. L. S. Amery, 222*
- Moyer, L. R. Prairie Flora of Southwestern Minnesota, 714*
- Mozambique, Impressions and Scenes of. O. W. Barrett, 224*
- Mudie, R. China and Its Resources, Peculiarities, etc. . . . Opium Question and Notice of Assam, 237*
- Mugnier-Pollet, Lieut. De l'Adrar à la Baie du Lévrier, 556*
- Muir, J., *joint author*, see J. Burroughs and I. C. Rosse.
- Mullan, J. Miners' and Travelers' Guide to Oregon, Washington, Idaho, etc., 400*
- Müller, A. Unterricht in der mathematischen und astronomischen Geographie nach Umfang und Methode, 318*
- Müller, Dr. E. Volksdichtekarte von Neu-Vorpommern und der Insel Rügen; Gröse und Lage der Wohnplätze von —, 710*
- Müller, F. Zur Geschichte und Natur der Schelde-Mündungen in der Niederländischen Provinz Zeeland, 952*
- Müller, J. W. von. Reisen in den Vereinigten Staaten, Canada, und Mexico, 319*
- Müllerus, Andreas. Monumenti Sinici, quod Anno Domini MDCXXV terris in ipsâ Chinâ erutum, etc., 237*
- Mumm, A. L. Five Months in the Himalaya, 319*
- Mundy, F. W. Earning Power of Railroads, 1909 (Compilation), *n.*, 218
- Muni, Territorios Españoles del. E. López Perea, 224*
- Municipal Trading, Dangers of. R. P. Porter, *n.*, 943
- Munich: ¶ Beziehungen zwischen Regenfall u. Quellergiebigkeit, unter besonderer Berücksichtigung der Münchener Wasserversorgung und der Kissinger Quellen. Dr. L. Frank, 871*
- Munro, I. Narrative of Military Operations on the Coromandel Coast, against the combined forces of the French, Dutch, and Hyder Ally Cawn, from . . 1780 to the peace in 1784, 480*
- Munro, J. E. C. Constitution of Canada, 319*
- Muret, E. Orthographie des noms de lieu de la Suisse Romande, 478*; see also F. A. Forel, *joint author*.
- Murman Coast: ¶ Murmanische Küste. H. Rottmann, 719*; *Rybnia Promysli Murmana i yevo Kolonizatsia* [Fisheries and Colonization]. Vs. Drzevicki, 316*
- Murray and Darling Rivers, Sketch of — showing position of gauging stations and the southern border of artesian area, 798*
- Murray, J. Scientific Work of the British Antarctic Expedition, 1907-9, 72*; British Antarctic Expedition, 1907-9. Editor Reports of scientific investigations. Vol. I. Biology, *rev.*, 145
- Murray, Sir John. Alexander Agassiz: His Life and Scientific Work, 794*; The Deep Sea, 119; Personal, 529; — and L. Pullar. Bathymetrical Survey of the Scottish Freshwater Lochs, conducted under the direction of — during 1897 to 1909, 320*
- Musil, Dr. A. Explorations in Arabia, 137
- Muss-Tau, The Glacial Group of. [In Russian.] Bl. Rieznicenko, 224*
- Muszynski, Oberstleut. O. Gebirgspässe des Chanats Buchara. Nach russischen Quellen, 951*
- Myres, Prof. J. L. Greek Lands and the Greek People, 558*
- Mysia: Das westliche Mysien und die pergamenische Landschaft. Dr. A. Philippson, 951*
- N.
- Naegi, Province Mino, Geol. Map showing Distribution of Stream-Tin in Environs of the Town of, 877*
- Naga Tribes of Manipur. T. C. Hodson, *rev.*, 698
- Nakamura, S., and K. Honda. Seiches in Some Lakes of Japan, 717*
- Namib, Erforschung der. Dr. Klein-kemm-Kettwig, 69*

- Nansen, Dr. Explains Amundsen's Adventure in the Antarctic, 451
- Nantucket Shoals, Chart U. S. Coast and Geod. Surv., 545*
- Nash, W. L., *Compiler*. Egypt Exploration Fund. General Index to Archaeological Reports. Vols. I-XVIII, 960*
- Natal, Catalogue of Collection of Rocks and Minerals from — and Zululand arranged stratigraphically. F. H. Hatch, 555*; Report of Mining Industry, 1909. C. J. Gray, 396*
- Nations, Culture of the. M. Jefferson, 241; Ruling Nations; Considerations on Their Characters. V. Dingelstedt, 872*
- Navaho National Monument, Prel. Report on a Visit to. J. W. Fewkes, 788*
- Navigation: ¶ Method for Determining the Position of Vessel in Sight of Fixed Point. Capt. N. Marcantetti, 470*; Model Experiments on Suction of Vessels. E. W. Taylor, Reverse Pilot Chart of North Atlantic Ocean, 545*; Nautical Science in its Relation to Practical —, together with Study of Tides and Tidal Currents. C. L. Poor, *rev.*, 469
- Naville, E. Le commerce de l'ancienne Égypte avec les nations voisines, 869*; — and S. Clarke. Egypt Exploration Fund. Thirtieth Memoir; The XIth Dynasty Temple at Deir El-Bahari, Part II, 236*
- Nebraska: ¶ Geographic Influences in the Development of. G. E. Condra, 221*; Kansas and — Handbook for 1857-8. N. H. Parker, 236*; Kansas and — Results of Spirit Leveling in, 1896-1909. R. B. Marshall, 948*; Outline of History. A. Watkins, 553* ¶ Map of Nebraska: Outcrop Area of Niobrara formation in South-Central, 229*
- Negros and Cebu. Northern part of Tañon Strait, Chart U. S. Coast and Geod. Surv., 309*
- Negros and Vicinity, Harbors in. Charts U. S. Coast and Geod. Surv., 632*
- Nehlil, *joint author*, see Lieut. Leffèvre.
- Nelson, E. W. Land of drought and Desert—Lower California, 868*
- Nemry, L. Les possessions allemandes dans la mer du Sud, 557*
- Netherlands: ¶ Colonisation chez les Hollandais. J. Leclercq, 398*; Dutch Republic and American Revolution. F. Edler, 800*; Hollandsche Duinen, Grondwater en Bodemdaling. E. Du Bois, 719*; Morphologische Bau des niederländischen Diluviums nördlich vom Rhein. J. van Baren, 71* ¶ Maps of the Netherlands: Das heutige Zeeland nach Kuijper, 711*; Historische Karte von Zeeland nach Utrecht Dresselhuis, 711*; Overzichtskaart van de not heden bekende Veenbruggen in Nederland en N. W. Deutschland, 959*
- Nettancourt-Vaubecourt, J. de. Sur les grandes routes de l'Asie Mineure, *n.*, 65
- Neuchâtel: Évolution de la Flore neuchâteloise. H. Spinner, 478*
- Neu-Hannover, Höhenschichtenkarte und Geol. Kartenskizze von. Dr. K. Sapper, *n.*, 232
- Neu Mecklenburg, Maps: Höhenschichtenkarte u. Geol. Kartenskizze von Nord; von Süd. Dr. K. Sapper, *n.*, 232; Übersichtskarte von — u. den Nachbargebieten . . . Lage bekannt gewordenen Terrassen. Dr. K. Sapper, *n.*, 232; Übersichtsk. der ungefähren Volksdichte auf — u. den Nachbargebieten. Dr. K. Sapper, *n.*, 232; Verbreitung der Vegetationsformationen auf — u. Nachbargebieten. Dr. K. Sapper, *n.*, 232
- Neuse, Dr. R. Landeskunde von Frankreich, *n.*, 383
- Nevada: ¶ Geology and Oil Prospects in Reno Region. R. Anderson, 474*; Tertiary Mammal Beds of Virgin Valley and Thousand Creek in N. W. Nevada. J. C. Merriam, 313*; Two Areas of Oil Prospecting in Lyon Co. R. Anderson, 313* ¶ Maps of Nevada: Carson Sink Quad., 75*; Furnace Creek Quad., 75*; Hawthorne Quad., 873*; Sketch map of portion of west-central, 874*
- Neve, Dr. A. Sketch Map to illustrate explorations of — in the Himalayas, 957*
- Newark Bay, Chart U. S. Coast and Geod. Surv., 76*
- Newbigin, Dr. M. L. Modern Geography, *rev.*, 942
- New Brunswick: Tobique District. G. A. Young, 949* ¶ Map of New Brunswick: Prince Edward Island, Nova Scotia and New Brunswick. R. E. Young, 78*
- Newburyport Harbor, Chart U. S. Coast and Geod. Surv., 309*
- New Caledonia: ¶ Statistiques du Commerce, 1908. Nouvelle Calédonie et Dépendances, 792*; Statistiques de l'industrie minière . . . 1908, 558*;

- Exploitation du Chrome de 1900 à 1908, 718*
- Newcombe, A. C. Village, Town and Jungle Life in India, 319*
- Newell, F. H. Reclamation of Arid West, 714*
- New England: ¶Expansion of New England: The Spread of Settlements and Institutions to Mississippi River, 1620-1865. L. K. Matthews, *rev.*, 531; Occurrence and Composition of Well Waters in Granites of. F. G. Clapp, 635*
- Newfoundland, Five Months in Labrador and —, during the summer of 1838. E. W. Tucker, 480*
- New Guinea: ¶Exploration of, 687; German-Dutch Boundary Expedition in, 369; Vingermtlatie in Centraal Nieuw-Guinea. J. C. van Eerde, 638*
British New Guinea: See Papua.
Dutch New Guinea: ¶Explorations in. Dr. Lorentz's Ascent of Wilhelmina Peak, 837; Expedition to the Snow Mountains of. H. A. Lorentz, 718*, 952*; Îles Arou et Kei. Dr. J. Roux, 156*; Capt. Koch's Explorations in W. New Guinea, 857; Woordenlijst verzameld op de Mimika en Atoeka-Rivieren. J. M. Dumas, 156*; Vorläufiger Bericht über die Deutsche Mamberamo-Exp. in Nied.-Neu-Guinea. M. Moszkowski, 557*; Wetenschappelijke uitkomsten der Mamberamo-Expeditie 1909-10, 718*
¶Maps of Dutch New Guinea: Aanvullings en Verbeterblad van Zuid-Nieuw-Guinea, 160*; Map to illustrate the Expedition of H. A. Lorentz in 1907-9, 472*, 710*; De Mamberamo-Rivier, *n.*, 550; Part of — to illustrate explorations of Capt. C. G. Rawling, etc., *n.*, 878; Schetskaart van het Sentani-Meer, Noord Nieuw-Guinea. F. J. P. Sachse, *n.*, 957*
German New Guinea: See also Kaiser Wilhelmsland: ¶Erdbeben-tätigkeit in Deutsch Neuguinea. A. Sieberg, 226*; Fortführung des Gutta-percha und Kautschuk-Unternehmens und Reisbauversuche in Neu Guinea, 226*; Gemüsekultur in den Tropen, 397*; In das Hinterland der Nordküste des Kaiser Wilhelmslandes. Dr. G. Friederici, 156*; Keizerin Augusta-Rivier, *n.*, 392
- New Hampshire: ¶Forestry Progress in. W. R. Brown, 474*; Petrography of Tripyramid Mountain. L. V. Pirs-son, 789*; Some Ore Deposits in Maine and the Milan Mine. W. H. Emmons, 313*; Results of Spirit Lev-elling in Maine, New Hampshire, etc., 1896-1909. R. B. Marshall, 66*
¶Maps of New Hampshire: Frye-burg, Quad., 873*; Kames of Maine and S. E. New Hampshire. 954*; Soil Survey map of Nashua area, 158*
- New Hanover, Bismarck Archipelago. See Neu Hannover.
- New Haven Harbor, Conn., Chart U. S. Coast and Geod. Surv., 631*
- New Hebrides, Dr. F. Speiser's Ethno-logical Investigations in, 857
- New International Year Book . . 1910. F. M. Colby, *editor*, 560*
- New Jersey: ¶Annual Report of State Geologist for 1909, 152*; New Jersey and Forestry. G. E. Lyon, 221*; Notes on Mineral Industry. H. B. Kümmel, 714*
¶Maps of New Jersey: Green-wood Lake Quad., 75*; Ramapo Quad., 75*; Charts U. S. Coast and Geod. Surv.: Passaic R., Newark Bay to Belleville, 76*; Raritan River from — Bay to New Brunswick, 309*
- Newland, D. H. Map of New York showing distribution of Salina Strata, *n.*, 230; — and H. Leighton. Gypsum Deposits of New York, 66*
- New Mecklenburg. See Neu Mecklen-burg.
- New Mexico: ¶Carthage Coal Field. J. H. Gardner, 313*; Coal Field be-tween San Mateo and Cuba. J. H. Gardner, 313*; Investigations of Coal Fields in Colorado and — in 1909. G. C. Martin, C. W. Washburne and Others, 151*; Isolated Coal Fields in Santa Fé and San Miguel Cos., J. H. Gardner, 151*; Preliminary Report on Ground Waters of Estancia Valley. O. E. Meinzer, 221*; The Type Localities of Plants first described from. P. C. Stanley, 394*
¶Maps of New Mexico: Estancia Valley showing Depth and Quality of Ground Waters, 954*, — showing Physiography and Pleistocene and Recent Geology, 954*; location of Estancia, Encino and Pinos Wells Basins, 954*; Fort Bayard Special Map, 308*; Geol. Map of Part of N. W. —. N. H. Darton, 157*; Map of —, showing Locations and Names of Metal Mining Districts, 157*; Map showing geol. relations of fissure veins near Pinos Altos, 874*; Map of New Mexico, *n.*, 158; Reconnaissance Geol. Map of Ancient Lake Bed in Encino Basin, 954*
- New South Wales: ¶Brief Review of Fisheries in. D. G. Stead, 477*; Geo-logy of Murrumbidgee R. District, near Yass. L. F. Harper, 477*; La

- Nouvelle-Galles du Sud. P. Privat-Deschanel, 397*; Rainfall in. H. A. Hunt, 527; Records Geol. Survey, 557*
- ¶ Maps of New South Wales: Geol. Map of Forbes-Parkes Gold Field, 957*; Plan Showing Allan Cunningham's Route and Site of First recorded discovery of Gold in Australia, 957*
- New York City: ¶ History of the City of — 1609-1909. J. W. Leonard, 236*; Landmarks of Old New York. E. Greatorex, 236*; The Real New York in 1910. M. Jefferson, 737 ¶ Maps of New York City: Free Public Educational Institutions of — in 1911, 955*; New Standard Map of Greater New York, *n.*, 795
- New York State: ¶ Birds of. E. H. Eaton, 960*; Calcites. H. P. Whitlock, 960*; Geographical Influences in Development of. R. H. Whitbeck, 475*; Geology of New York City (Catskill) Aqueduct. C. P. Berkey, 553*; Geology of Poughkeepsie Quad. C. E. Gordon, 867*; Gypsum Deposits of. D. H. Newland and H. Leighton, 66*; Historical Collections of. J. W. Barber and H. Howe, 236*; History of Purchase and Settlement of Western — and Rise, Progress, . . . Presbyterian Church in that Section. J. H. Hotchkin, 236*; Minutes of Executive Council of the Province of New York. Administration of Francis Lovelace, 1668-1673 . . . portrait, facsimiles, etc., from original MS. in the British Museum. V. H. Paltsits, *editor*, Vol. I, 319*; Vol. II, 560*; Proceedings of the Seventieth Ann. Meeting of N. Y. State Agricultural Soc., 789*; Railroad Distances in New York. A. E. Parkins, 26; Report of State Entomologist on Injurious and Other Insects of, 1909, 152*; 1910, 554*; Report of the — State Museum, 1909, Vols. I and II, 960*; Topographic Map of, 854 ¶ Maps of New York State: Antwerp Quad., 873*; Bath and Stony Creek Quadrangles, 75*; Distribution of Salina Strata. D. H. Newland, *n.*, 230; Greenwood Lake Quad., 75*; Monticello Quad., 629*; Neversink Quad., 389*; Geol. Map of Poughkeepsie Quad., *n.*, 546; Ramapo Quad., 75*; Map of western — showing distribution of morainal deposits, 954*; Revised Areal Geol. of Southern Manhattan Island and adjacent margin of Long Island, 390*; Sketch Map of Catskill and Croton Water Supply Systems, 390*; Geol. Formations along the proposed lines for distribution conduits, 390*; Sketch Map of S. E. Adirondack region showing relation of pre-Glacial drainage to that of the present, 795*; Sketch Map showing oil and gas fields, location of quadrangles and nature of geol. reports on each, 874*; Soil Survey of Washington Co., 389*; Charts U. S. Coast and Geod. Survey: Huntington Bay, L. I. Sound, 309*; Montauk Point to New York and L. I. Sound, 309*; North Shore Long Island Sound. Rhineck to New Rochelle, 76*
- New Zealand: ¶ An Anomalous Island. C. de Thierry, 557*; Flower-Hunter in Queensland and New Zealand. Mrs. Rowan, 319*; Glaciation of. P. Marshall, 70*; Great Ice Age of. Prof. J. Park, 70*; La Nuova Zelanda (Una Italia Australe). G. Capra, 718*; Official Year-Book 1910, 792*; Origins of the New Zealand Nation. G. H. Scholefield, 718*; Terra Nova as a Survey Ship, 622 ¶ Map of New Zealand: North Island: South Island. Shows Land Transactions, 1909-10, 232*
- N'Goindé, Exploration de la rivière —. E. Mallet, 476*
- Niagara Falls: ¶ L'évolution des chutes du Niagara. J. W. Spencer, 66*; Relative Work of the Two Falls. J. W. Spencer, 714* ¶ Map of, 876*
- Niagara River, Relationship of — to Glacial Period. J. W. Spencer, 151*, 714*
- Nicaragua, Archæological Researches in. J. F. Bransford, 720*
- Nickles, J. M. Bibliography of North Amer. Geology for 1909 with Subject Index, 66*
- Nicolesco, M. Description de la distribution géographique du pétrole en Roumanie, 871*
- Nicolle, E. Rapport sur la question du Méridien de Greenwich comme base des fuseaux horaires, spécialement . . . au point de vue de la France, 73*
- Nielsen, J. N. Sur les températures des grandes profondeurs particulièrement dans la Méditerranée, 794*
- Nielsen, M. I. N. Carte montrant la distribution de la température . . . à l'époque du frai des principales *Gadides* (North Atlantic), 960*
- Nieve Penitente. See also Snow: Allerlei Beobachtungen über Schnee und Zackenfirn (Büsserschnee). F. Jaeger, 479*; Penitentesschneefelder Gebiet zwischen Aconcagua und Tupungato. Dr. F. Reichert, 475*
- Niger R.: ¶ Navigation on the Upper.

- A. Chevalier, 288; Relief de la Boucle du Niger. H. Hubert, 716*; Map: Schéma des Sources du Niger et du pays Toma, 955*
- Nigeria: ¶ Afrique Occidentale Française et Nigeria Anglaise. B. de l'Escale, 68*; Nigerian Studies; or, The Religious and Political System of the Yoruba. R. E. Dennett, *rev.*, 460
- Northern Nigeria: ¶ Map of Part of Nassarawa Province. D. Cator, 155*; Nigeria and Its Tin Fields. A. F. Calvert, *rev.*, 928; Origin of the Major Features of Geography of. J. D. Falconer, 396* ¶ Maps of Northern Nigeria: Northern Nigeria: Divisions administratives, 877*; Part of Nassarawa Province. D. Cator, 78
- Southern Nigeria: ¶ Annual Report, 1909, 951*; Blue Book for 1909, 69*; Land of Ekoi. P. A. Talbot, 155*; Memorial to Mungo Park and Richard Lander, 918; Mineral Survey of, 716*; Yola-Cross R. Boundary Comm. Maj. G. F. A. Whitlock, 396* ¶ Map of Southern Nigeria: Oban District. P. A. Talbot, *n.*, 79
- Nikkosan, Japan, Key to the Guide Map of, 560*
- Nile: ¶ Abflussgebiet des Nil. Dr. W. Pietsch, 637*; The Nile. Prof. W. Libbey, 637*; Valley of the. Capt. H. G. Lyons, 717*
- Nimrod, Voyage of the. Capt. J. K. Davis, 228*
- Nipe Bay Country — Cuba. I. A. Wright, 949*
- Nipigon Basin, Ontario, Geology of. A. W. G. Wilson, 554*
- Nipigon Lake, Thunder Bay District, Ontario, Map, 230*
- Nixon-Roulet, M. F. The Spaniard at Home, *rev.*, 383
- Noë, H. Brennerbuch. Naturansichten . . . Tirol, 238*; Neue Studien aus den Alpen, 238*; C Esterreichisches Seebuch, etc., 238*
- Noel, B. W. Notes of Tour in the Valleys of Piedmont . . . 1854, 238*
- Noetling, F. Antiquity of Man in Tasmania, 871*; Food of Tasmanian Aborigines, 871*
- Nolan, E. H. Illustrated History of British Empire in India, and the East from Earliest Times to Suppression. . . Sepoy Mutiny in 1859, 319*
- Nolen, J. Madison: A Model City, *rev.*, 625
- Noll, A. H. Life and Times of Miguel Hidalgo y Costilla, *rev.*, 374
- Nolloth, Port — (Südafrika), 396*
- Nordenskiöld, E. v. Exploration ethnogr. et archéol. en Bolivie, 475*; Siriono-Indianer in Ostbolivien, 395*
- Norfolk and Suffolk Coast. W. A. Dutt, *n.*, 382
- North America. See under America.
- North Carolina: ¶ Exploration of Mounds in. C. Peabody, 394*; Forest Fires and their prevention, including Forest Fires in — during 1910. J. S. Holmes, 960*; Results of Spirit Leveling in . . . 1896-1909. R. B. Marshall, 313*; Summer Notes on Mountain Vegetation of Maywood Co. R. M. Harper, 66* ¶ Maps of North Carolina: Abingdon Quad., 629*; S. Ellijay Quadr., 389*; Distribution of Granites and Granite Quarries, 76*; Pamlico Sound, 875*; Map showing production of cotton in 1909, 223*; Charts U. S. Coast and Geod. Survey: Albemarle Sound from Pasquotank R. to Roanoke and Chowan Rivers, 309*; Atlantic Coast from Cape Henry to Cape Lookout, 309*; Oracoke Inlet to Beaufort, including Core Sound, 76*; Pasquotank R., 309*
- North Dakota: ¶ Natural Gas in. A. G. Leonard, 474*; Washburn and Fort Berthold Lignite Fields. C. D. Smith, 222* ¶ Maps of North Dakota: Map showing location of Gas Wells, 630*; Sketch Map of Missouri Coteau and its Moraines. J. E. Todd, 955*
- Northeast Passage: ¶ Über die Fahrten der Novgoroder durchs karische Meer und . . . Halbinsel Jalmal zum Ob. A. Sibiriakoff, 70*
- North Island, N. Z. Map showing Land Transactions 1909-10, 232*
- North Pole: See Pole, North.
- North Sea: ¶ Oberflächentemperatur beobachtungen in der Nordsee. Dr. E. van Everdingen, 228*
- Norway: ¶ New Climbs in —. Account of Some Ascents in Søndmore District. E. C. Oppenheim, 238*; Ricerche oceanografiche Norvegesi. G. Platania, 317*; The Saga of King Sverri of. Translated by J. Sephton, 239*; Variations périodiques des glaciers, 1909. Norvège. P. A. Øven, 559* ¶ Maps of Norway: Generalkart over det sydlige Norge i 18 Blade, 80*; Topografisk kart over kongeriget Norge, 80*
- Notizblatt des Vereins für Erdkunde und der Grossh. Geol. Landesanstalt zu Darmstadt für 1909, 227*
- Nova Scotia: ¶ Arisaig-Antigonish District. M. Y. Williams, 949*; Gold-bearing Series of Lahave Basin. E. R.

- Faribault, 949*; Report of Dep. of Mines, 1910, 635* ¶ Map of Nova Scotia: Prince Edward Island, Nova Scotia and New Brunswick. R. E. Young, 78*
- Novaya Ziemla: Découverte de gisements de glace fossile à la Nouvelle-Zemble et au Spitsberg. C. Rabot, 479*; *Kolonisty Nowoi Ziemi* (Colonists in 1910). N. Pietukhof, 719*; Northern Island of. New Station. [In Russian.] N. Pietukhof, 793*; Novoziemelskaya Zima [Winter of 1909-10]. I. Anufrief, 639*; Novaya Ziemla. T. Sokratova [Account of latest Explorations], 479*; Russian Expedition to, 291; Winds and Ice in the White Sea and Novaya Ziemla in 1910. I. Anufrief, 559*
- Novicov, J. de. Expansion de la langue française dans le monde, 479*
- Nubia, Egypt, — and Ethiopia. J. Bonomi *et al.*, 319*; Karanòg. The Romano-Nubian Cemetery. C. L. Woolley and D. Randall-MacIver, *n.*, 388
- Nueva Leon, Historia de, — con Noticias sobre Coahuila, Tejas y Nuevo Mexico. Cap. Alonso de Leon *et al.*, Documentos inéditos . . . pub. por G. García, 40*
- Nugent, Sir Walter Richard. Irlande industrielle, 227*
- Nulato—Council Region, Alaska, Mineral Resources of. P. S. Smith and H. M. Eakin, 151*
- Nulato—Norton Bay Region, Alaska, Geol. Map of, *n.*, 630
- Nuttall, Z. Island of Sacrificios, 222*
- Nutting, C. C. Hydroids (Harriman Alaska Series), 480*
- Nyasaland: ¶ Agricultural Labour Conditions in. J. C. Casson, 556* ¶ Map: Carte géol. du Nyassaland. A. R. P. Andrew et T. E. G. Bailey, 708*
- O.
- Oak, Book of the English —. C. Hurst, *n.*, 944
- Oberhummer, Prof. E. Œuvre géographique d'Alexandre de Humboldt au Mexique, 636*; Terrainarstellung auf Stadtplanen, 74*
- Obi and Yenisei, Gulfs of. Chart Compiled 1910 from surveys 1828-1909, 799*
- Obituary:
Ameghino, Dr. Don, Florentino, 921
Calvin, Prof. Samuel, 624
Emmons, Dr. Samuel Franklin, 294
Götz, Prof. Wilhelm, 529
Götzen, Count Adolph von, 59
Howell, Edwin E., 624
Levasseur, Pierre Émile, 862
Robb, J. Hampden, 294
Schenk, Dr. Alexandre, 204
Strauch, General, 861
Whymper, Edward, 861
- Oceania: ¶ Statistiques du Commerce, 1908. Établissements français de l'Océanie, 792*
- Oceanography: ¶ Bulletin Hydrographique pour 1908-1909, 74*; Campagne scientifique de la Princesse Alice. Liste des Stations. J. Richard, 399*; Sur la dixième campagne de la *Princesse-Alice II.*, 399*; Sur la douzième Campagne de la —. Prince Albert I, de Monaco, 872*; Conseil Permanent Intern. pour l'Exploration de la Mer. Rapports et Procès-Verbaux des Réunions, 1909-10, 640*; Contributions au Système des Méduses, basées sur des Formes bathypélagiques des Campagnes Scientifiques de Prince de Monaco. Dr. O. Maas, 317*; Couleurs des Fonds marins. J. Thoulet, 318*; Die dänische ozeanographische Expedition nach dem Mittelmeere, 1908-9. N. Mey, 228*; The Deep Sea. Sir John Murray, 119; Elementare Theorie der Gezeiten; nebst den Gezeitenkonstanten der wichtigsten Orte des Indischen Archipels und anderer Hafenplätze. J. P. van der Stok, 953*; Forschungsreise S. M. S. Planet, 1906-7. III Band: Ozeanographie. Dr. W. Brennecke. Dr. Gräf, und Dr. A. Krämer, *n.*, 212; Hydrographische Beobachtungen der schwedischen Expedition nach Spitzbergen 1908. A. C. Reichard, 872*; Mesure des densités d'Eaux marines par flotteurs totalement immergés. J. Thoulet et Chevalier, 318*; Method of Mapping the Distribution of Marine Algae. N. M. Johnson, 399*; Neuere ozeanographische Arbeiten der Deutschen Marine . . . Seewarte. Dr. G. Schott, 74*; Origin and Peopling of the Deep Sea. Prof. J. Walther, 318*; Origin of the Permanent Ocean Highs. J. W. Humphreys, 953*; Ozeanographische Arbeiten der Deutschen Antarktischen Expedition. Dr. W. Brennecke, 952*; Physische Meereskunde. Dr. G. Schott, *n.*, 387; Principaux résultats d'océanographie physique (Expédition Antarctique du Dr. Charcot). J. Rouch, 872*; Über die ozeanographischen Ergebnisse der Ausreise . . . Planet. L. Mecking, 317*; Résumé des Ob-

- servations sur le Plankton des Mers explorées par le Conseil pendant . . . 1902-8, 318*; Ricerche oceanografiche Norvegesi. G. Platania, 317*; Températures de l'Atlantique Nord (Surface et Profondeurs). A. Hautreux, 640*; Sur les températures des grandes profondeurs particulièrement dans la Méditerranée. J. N. Nielsen, 794*; Tiefsee-Forschungen der "Planet" — Expedition, 1906-07. Dr. W. Brennecke, 72*; Tiefseelotungen S. M. S. Planet, 1910, 399*; Unterseeische Gebirge. Dr. M. Groll, 640* ¶ Maps: Carte générale bathymétrique des Océans. H. Bourée, 73*; Maps showing distribution of pelagic fry and the spawning regions of gadoids in North Atlantic Ocean, 960*
- Odenwald, Maps: Karte zur Siedlungsgeographie des Odenwaldes, 798*; Übersichtskarte der Siedlungsverteilung im, 798*
- Oestreich, K. Oberfläche Mazedoniens, 227*
- Ögel Lake, Formation of an Island on. Prof. Potonié, 623
- Ogilby, J. Africa: Being an Accurate Description of the regions of Aegypt, Barbary, Lybia, and Billedulgerid . . . Abyssines, etc. Collected and Translated from most Authentick Authors (1670), etc., by —, 319*
- Ogowé, Reconnaissances sur l'. J. Dubrouillet, 555*
- O'Harra, C. C. Badlands of the Black Hills, S. D., 52; Map of Black Hills Region, S. D., n., 77
- Ohio: ¶ Abandoned Shore Lines of the Oberlin Quadrangle. F. Carney, 394*; Geographic Influences in the Development of. F. Carney, 867*; Mineral Resources of. J. A. Bownocker, 714*; Raised Beaches of Berea, Cleveland and Euclid Sheets. F. Carney, 394* ¶ Maps of Ohio: Antrim Quad., 544*; Conesville, Frazeyburg, Granville, McConnelville and Philo Quadrangles, 75*; Covington, Delphos, and Uhrichville Quadrangles, 873*; New Lexington Quad., 389*; Sketch Map of Parts of Ohio, etc., showing oil and gas fields, location of Quadrangles and nature of geol. reports published on each, 874*
- Ohio River, From the Hudson to the. W. B. Wilson, 720*
- Ohnefalsch-Richter, Dr. M. Entdeckung des bei Homer erwähnten Räucheraltarpfates der Aphrodite in Paphos auf Cypern, 317*
- Okakura-Kakuzo. Awakening of Japan, 400*
- Oklahoma: ¶ Analyses of Crude Petroleum from Oklahoma and Kansas. D. T. Day, 151*; Director's Biennial Report, 1910, 715*; Madill Oil Pool. J. A. Taff and W. J. Reed, 151*; Oklahoma Geol. Survey, 521; Report on geological and Mineral Resources of Arbuckle Mts. C. A. Reeds, 880* ¶ Maps of Oklahoma: McComb Quadrangle, 308*; Pawhuska Quad., 75*; Map showing production of cotton in 1909, 229*; Progress Geological Map of. C. N. Gould, 796*
- Olbricht, K. Diluvium in der Umgebung von Hanover, 315*; Höhenschichtenkarte der Lüneburger Heide, 226*; Städte des rheinisch-westfälischen Industriebezirks, 398*
- Oldys, H., *joint author*, see T. S. Palmer.
- Olivares, J. de (*et al.*). Our Islands and their People, as seen with Camera, etc., 319*
- Oliveira Lima, de. Limites actuelles du Brésil par suite des derniers arbitrages et traités, 868*
- Oliver, M. L. The Snake Dance, 714*
- Olsson-Seffer, Helen. Isthmus of Tehuantepec, 152*
- Olsson-Seffer, P. Genesis and Development of Sand Formations on Marine Coasts, 953*
- Olympia, Burial of. E. Huntington, 398*; Die Funde von Olympia. (R. Borrmann), 237*
- Oman: ¶ On Border of the Great Desert: Journey in Oman. Lieut.-Col. S. B. Miles, 70*; Notes on. Rev. S. M. Zwemer, 396*
- Omori, F. Usu-San Eruption and Earthquake and Elevation Phenomena, 951*
- Onondaga Sea, Southerly Extension of — in the Allegheny Region. E. M. Kindle, 714*
- Ontario: ¶ Conservation of Natural Resources of. Hon. F. Cochrane, 475*; Conservation of Water-Powers of. Hon. Adam Beck, 475*; Devonian of Southwestern Ontario. C. R. Stauffer, 949*; Geology of Haliburton and Bancroft Areas. F. D. Adams and A. E. Barlow, 66*; Geology of Nipigon Basin. A. W. G. Wilson, 554*; Instrumental Survey of Shorelines of Extinct Lakes Algonquin and Nipissing in S. W. — J. W. Goldthwait, 949*; Prairie Province: Sketches of Travel from Lake Ontario to Lake Winnipeg. J. C. Hamilton, 400*; Settlement of Northern —. T.

- Southworth, 66*; Simcoe District. W. A. Johnston, 949* ¶ Maps of Ontario: Algoma, Sudbury and Nipissing Districts, 546*; Diagrams Showing Present Attitude of Algonquin, and of Nipissing Water Plane, 633*; Cowganda sheet. R. E. Young, 77*; Outline Map of part of southern —, 633*
 Ontography: Organic Response. Dr. D. T. Macdougall, 399*
 Opium: Question de l'opium. Un nouvel accord anglo-chinois, 951*
 Oporto: Relatorio da Direcção do Ano de 1910, 478*
 Oppel, Dr. A. Seestädte der Erde nach ihren Leistungen im Schiffsverkehr und im Wertumsatz, 479*
 Oppenheim, E. C. New Climbs in Norway. Account of Some Ascents in Søndmore District, 238*
 Oppenheim, Dr. M. Fr. v. Zweite Reise in der Asiatischen Türkei 1899 von — (Maps), 798*
 Oracoke Inlet, N. C., to Beaufort, including Core Sound, Chart U. S. Coast and Geod. Surv., 76*
 Orange and Vaal Rivers, Map: Kärtchen der Eisbewegung zur Dwyka-Eiszeit am Oranje und Vaal, 708*
 Oranges, Low Temperatures Injurious to, 367
 Ore Deposits, Map: Weltkarte der Erzlagerstätten. J. W. H. Adam, n., 80
 Oregon: ¶ Gas and Oil Prospects near Vale, etc. C. W. Washburne, 474*; Gas Prospects in Harney Valley. C. W. Washburne, 474*, 714*; Oregon, Washington, Idaho, etc. Miners' and Travelers' Guide to. J. Mullan, 400*; Prel. Report on the Coos Bay Coal Field. J. S. Diller and M. A. Pishel, 867*; Results of Spirit Leveling in.—, 1896 to 1910. R. B. Marshall, 867* ¶ Maps of Oregon: Crater Lake National Park, 874*; Eugene Quad., 75*; Index Map to Atlas Sheets, n., 631; Map of Middle Part of Coos Bay Coal Field. J. S. Diller and M. A. Pishel, 630*; Maps of Coos Bay Coal Field and of Township. J. S. Diller and M. A. Pishel, 630*; Northern Part of Coos Bay Coal Field. J. S. Diller and M. A. Pishel, 630*; Reconnaissance Sketch Map of Prospective Gas and Oil Fields near Vale, n., 630; Chart U. S. Coast and Geod. Survey: Pacific Coast. Cape Lookout to Gray's Harbor, 76*
 Organic Response. Dr. D. T. Macdougall, 399*
 Orléans, Prince Henri d' —. From Tonkin to India by the Sources of Irrawadi, 237*
 Ortúzar, A. Chile of To-Day, Its Commerce, Production, etc., 319*
 Osborn, H. F. Age of Mammals in Europe, Asia and North America, *rev.*, 541
 Ossenbruggen, F. D. E. van. Eigenaardige Gebruiken Bij Pokken-Epidemieën in den Indischen Archipel, 557*
 Ostrich Industry, Application of Science to. Prof. J. E. Duerden, 396*
 Otahiti. See Tahiti.
 Otero de Herreros, Segovia, Ensayo de los Métodos fotogramétricos, en el Término municipal de —. J. Galbiss y Rodríguez, 960*
 Ottawa R. Basin: Water Wealth of Canada with Special Reference to —. C. R. Coutlee, 475* ¶ Map of the Ottawa River Basin, 230*
 Oustry, M. Notes sur le Haut Ziz, 476*
 Overbergh, Cyr. van, et Ed. de Jonghe. Les Bangala, *rev.*, 303
 Owen, L. A. Missouri R. and Its Future Importance to the Nations of Europe, 948*
 Owens, Dr. J. S. Experiments on Settlement of Solids in Water, 317*
 Oxley, T. L. Jacques Balmat, or, The First Ascent of Mont Blanc, 239*
 Oxyrhynchus Papyri. Part VIII. Edited with translations and notes by A. S. Hunt, 880*
 Øyen, P. A. Variations périodiques des glaciers 1909. Norvège, 559*
 Oysters: Ostréiculture, 872*
 Ozark Regions, Soils of. Prof. C. F. Marbut, 366
- P.
- Pacific Coast, Charts U. S. Coast and Geodetic Survey, 76*, 875*
 Pacific Ocean: ¶ Forschungsreise S. M. 'S. Planet, 1906-7. Dr. W. Brennecke, Dr. Gräf, und Dr. A. Krämer, n., 212; Seismische Verhalten des Atlantischen und Pazifischen Ozeans. Dr. G. Gerland, 73*; Temperatur- und Salzgehaltsbestimmungen aus den Oberflächen- und Tiefenschichten des südwestlichen Stillen Ozeans, 318*; Tiefsee-Forschungen der "Planet"— Expedition. Dr. W. Brennecke, 72*; Verlauf der Deutschen Marine-Expedition 1907-9. Dr. A. Krämer-Bannow, 226*
 ¶ Maps of the Pacific Ocean: Approximate Tracks of Typhoons and Depressions, Sept., 1910, 473*; Routes of

- Galleons in the Pacific as Noted in their Log Books, 799*; Charts of the U. S. Hydrographic Office: Pilot Charts of the North Pacific, 158, 229, 309, 389, 470*; Pilot Charts of the South Pacific, 158, 229, 470*; U. S. Weather Bureau Charts: Meteorological Charts of the North Pacific Ocean, 158, 229, 309, 389, 632*; Meteorological Charts of the South Pacific, 158, 389*.
- Pacific Ocean, Islands of the. See also South Sea Islands: Eastern Pacific Lands: Tahiti and the Marquesas Islands. F. W. Christian, *rev.*, 380; Fur Seals and Fur-Seal Islands of the North Pacific. D. S. Jordan *et al.*, 239*; Voyage of the S. Y. "Nimrod." Capt. J. K. Davis, 228*.
- Paige, S. Mineral Resources of Llano-Burnet Region, Texas, with an Account of Pre-Cambrian Geology, 948*.
- Palache, C., *joint author*, see B. K. Emerson.
- Palafox y Mendoza, Don Juan de. Su virreinato en la Nueva España, etc. Documentos inéditos . . . por G. García, 480*.
- Palencia, R. Wine Growing Industry in Argentina, 314*.
- Paleozoic Land Connections, Map of Part of Northern Hemisphere showing — and paths of marine faunal migrations, 959*.
- Palestine: ¶ Aufnahme des Ostjordanlandes durch den Deutsche Palästina-Verein. Prof. Dr. Guthe, 397*; Climate of Palestine. Dr. F. M. Exner, 368; Palestine and its Transformation. E. Huntington, *rev.*, 461; Sites délaissés d'Orient: du Sinaï à Jérusalem. Comte J. de Kergerlay, 225*. ¶ Map of Palestine: Karte des Ostjordanlandes. Dr. G. Schumacher, 709*.
- Palmer, H. Part of Selkirk Range adjacent to Mount Sir Sandford, (Map), 230*.
- Palmer Land. E. S. Balch, 282.
- Palmer, T. S., and H. Oldys. Progress of Game Protection in 1910, 948*.
- Paltsits, V. H., *editor*. Minutes of Executive, Council of the Province of New York. Administration of Francis Lovelace, 1668-1673 . . . from original MS. in the British Museum, Vol. I, 319*; II, 560*.
- Pamlico Sound, N. C., Chart U. S. Coast and Geod. Surv., 875*.
- Pampas, Gran-Chako und die. W. Simon, 67*.
- Panama: ¶ Up Country in. F. Lindsay, 314*; Geografía del Istmo de Panamá. R. M. Valdés, 640*; Prof. Pittier's Investigations in, 524; Republic of — its People with Special Reference to the Indians. E. Y. Bell, 314*.
- Panama Canal: ¶ Atlantic Terminal Docks on the, 620; Canal and Its Makers. V. Cornish, *rev.*, 62; Panama Canal, 134; Panama Canal. Dr. V. Cornish, 395*; — Col. G. W. Goethals, 790*; Work on the, 854. ¶ Map of Panama Canal: Contour Map and Profile of the Canal, *n.*, 230.
- Panama Canal Zone: ¶ Biological Survey of Panama Canal Zone, 53; Canal Zone Triangulation System, 365; Panama Canal Zone Land Survey, 854. ¶ Maps of Panama Canal Zone: Canal Zone. Location and Auxiliary Structures of the Canal, *n.*, 310; Colon Harbor. Chart U. S. Coast and Geod. Surv., 631*; Panama Road; Colon Harbor, 158*; Map showing Canal Zone and watershed of Rio Chagres, 230*; Map of Canal Zone, 230*.
- Panay, Charts U. S. Coast and Geod. Surv., 875*.
- Paparrigopoulos, M. C. Histoire de la civilisation hellénique, 400*.
- Paphos auf Cypern, Entdeckung des bei Homer erwähnten Räucheraltplatzes der Aphrodite in. Dr. M. Ohnefalsch-Richter, 317*.
- Papua. (British New-Guinea): ¶ Anthropological Expedition to New Guinea, 688; Chez les indigènes de la Nouvelle-Guinée Britannique. Marquis de Cacqueray, 225*; The New Guinea. B. Grimshaw, *rev.*, 381; Papua and the Papuans. Hon. J. G. Jenkins, 558*. ¶ Map of Papua: Map of Territory of, Latest Surveys, 957*.
- Paraguay: ¶ Aperçu de la géographie botanique du. Dr. R. Chodat and Dr. E. Hassler, 67*; Beiträge zur Kenntnis des Quebrachogebietes in Argentinien und Paraguay. Dr. R. Lütgens, 715*; Cuestión de Límites entre el Paraguay y Bolivia. A. Audibert, 720*; Reisen in Matto Grosso und —. C. Carnier, 869*; Unknown People in an Unknown Land. Account of the Life and Customs of Lengua Indians of the Paraguayan Chaco, with Adventures . . . amongst them. W. B. Grubb, *rev.*, 458.
- Para Rubber. See also Rubber: Die *Hevea Brasiliensis*, 872*.
- Pardee, J. T. Geol. Map of Upper St. Joe R. Basin, Idaho, 874*.
- Paris: ¶ Inondations à Paris du VI^e au XX^e siècle. E. Clouzot, 638*; Paris, port de mer. G. Blondel, 952*;

- Les Ports de. A. Pawlowski, *n.*, 383;
Travels from Berlin, through Switzerland to — in 1804. A. v. Kotzebue, 238*
- Paris, T. C. Letters from the Pyrenees during . . . 1842, 239*
- Park, Mungo, and Richard Lander, Memorial to, 918
- Park, Prof. J. Great Ice Age of New Zealand, 70*; Tarawera Eruption and After, 638*
- Parker, A. C. Iroquois Uses of Maize and other Food Plants, 714*, 394*
- Parker, N. H. Kansas and Nebraska Handbook for 1857-8, 236*
- Parkins, A. E. Comparison of Trans-Appalachian Railroads, 314*; Railroad Distances in New York, 26; Valley Filling by Intermittent Streams, 719*
- Paschinger, Dr. V. Schneegrenze in den französischen Alpen, 793*
- Pasi, P. Colonia del Capo, 950*
- Pasquotank R., Chart U. S. Coast and Geod. Surv., 309*
- Passaic R., Chart U. S. Coast and Geod. Surv., 76*
- Passarge, Dr. S. Geomorphologische Probleme aus Kamerun, 153*; Kalkpfannen des östlichen Damaralandes, 154*
- Passerat, Ch. Origines de la vallée de la Charente, 871*
- Pastures: Surcharge des pâturage et l'aménagement des montagnes. P. Descombes, 72*
- Patagonia: ¶ Bismarck-Gletscher, ein vorrückender Gletscher in der patagonischen Cordillere. Dr. R. Hauthal, 476*; Einige Beobachtungen über die Eingeborenen Westpatagoniens. C. Skottsberg, 153*; Patagonischen Anden zwischen 42. und 44. Grade s. Breite. Dr. P. Krüger, 949*; Wirtschaftliche Erschliessung Patagoniens. G. L. F. Córdoba, 869*; Map of Patagonia: Andine Gebiet Patagoniens zwischen 40° und 44° S. Prof. P. Krüger, *n.*, 634
- Pawlowski, A. L'île d'Yeu à travers les âges, d'après la géologie, la cartographie et l'histoire, 718*; Les Ports de Paris, *n.*, 383
- Peabody, C. Exploration of Mounds in North Carolina, 394*
- Pearl River Drainage Basin, 394*
- Pearson, H. H. W. On the Collection of Dried Plants obtained in South-West Africa by Percy Sladen Memorial Expedition, 1908-11, 717*
- Peary, Adm. R. E. The North Pole, Its Discovery in 1909, *rev.*, 214; Personal, 528; Peary Arctic Club Expedition to the North Pole, 1908-9, 72*
- Peddle, H. J. Development of Inland Waterways of the United Kingdom, 72
- Pedee, R. See Yarkin R.
- Pelliot, P. Trois ans de mission dans la Haute-Asie, 557*
- Pelvoux, Le Col du. H. Mettrier, 71*
- Penck, A. Erforschung des Kaiserin Augusta Flusses, 952*
- Pennsylvania: ¶ High Terraces and Abandoned Valleys in Western. E. W. Shaw, 714*; Mineral Resources of Johnston and Vicinity. W. C. Phalen and L. Martin, 553* ¶ Maps of Pennsylvania: Bedford, New Kensington, York and Zelenople Quadrangles, 75*; Butler Quad., 389*; Hamburg Quad., 874*; Economic and Structural Map of Johnstown Quad., *n.*, 389; Geol. Map of Foxburg Quad. showing Structure and Coal Outcrops. E. W. Shaw, 874*; Map showing original extent of Vanport limestone members in Foxburg quad., 874*; Reconnaissance Map of Oil and Gas Pools of Foxburg Quad., showing structure and producing Areas of various Oil Sands, 874*; Sketch Map of western — etc., showing oil and gas fields, location of quadrangles and nature of geol. reports printed on each, 874*; Sketch Map showing Thickness, Extent and Structure of the Third or Gordon Sand in Foxburg Quad., 874*; Soil Map of S. W. Pennsylvania, *n.*, 389; Taneytown Quad., 629*; Top. and Geol. Survey of, 1906-8, 880*
- Penobscot Bay and E. —, Charts U. S. Coast and Geod. Surv., 157*, 875*
- Pepperberg, L. J. Milk R. Coal Field, Montana, 221*
- Peppler, A. Fortschritte in der Erforschung der freien Atmosphäre während letzten Dezenniums, 953*
- Peralta, F. Contribution à l'étude de l'acclimatement du Bétail européen au Costa Rica, 554*
- Périgueux, Un syndicat de Navigation à — pour la Rivière de l'Isle en 1520. F. Villepelet, 719*
- Pernambuco: ¶ Dictionario chorographico, historico e estatístico de Pernambuco. S. de Galvão Vasconcellos, 223*
- Perron, C. Réfection en Fac-similé des anciens monuments de Géographie et son utilité . . . Musées cartographiques, 73*
- Perry, Commodore M. C. Sailing Directions and Nautical Remarks: by

- Officers of U. S. Naval Expedition to Japan under the command of —, 237*
- Persia: ¶Geographische Charakterbilder aus . . . und südlichen mesopotamischen Randgebirge (Puscht-i-küh). Dr. H. Grothe, *n.*, 65; The Glory of the Shia World. Tale of a Pilgrimage. Edit. and Transl. from Persian MM. by Maj. P. M. Sykes, *rev.*, 784; Aus dem Märchenlande von 1001 Nacht. Beobachtungen . . . eines Geologen in nördlichen Persien. Band I. H. Pohl, *n.*, 931; Meine Expedition durch Vorder-Asien (Klein-Asien, Mesopotamien, Persien). Dr. H. Grothe, 870*; Persia and Its People. E. C. Sykes, *n.*, 544; Persia in Revolution. With Notes of Travel in Caucasus. J. M. Hone and P. L. Dickinson, *rev.*, 462; The proposed Trans-Persian Railway. Lieut.-Col. A. C. Yate, 717* ¶Maps of Persia: Map of Eastern Turkey in Asia, Syria and Western Persia, *n.*, 160; North-East Persia, 160*; Strauss' Reiserouten im westlichen Persien, 310*
- Peru: ¶Arbitraje entre las repúblicas de Bolivia y el — y su última negociación sobre fronteras, *n.*, 302; Ein Bergfahrt im nördlichen —. Dr. O. Schlagintweit, 715*; La ciencia y los temblores. R. G. Rosell, 715*; Informe que la Comisión del Observatorio sismográfico presenta a la Sociedad geogr. de Lima, 715*; Climate and Man in Peru. Dr. L. L. W. Wilson, 67*; Distrito de Lunahuaná Provincia de Cañete. Fr. F. C. Salinas, 715*; Itinerario de los viajes de Raimondi en el Perú, 715*; Land of the Incas. Sir Clements R. Markham, 153*; Navegación nel el Perú. R. Melo, 715*; Note on Map of S. Peru and N. Bolivia. E. A. Reeves, 395*; Peru To-Day. Geographical Sketch. C. W. Sutton, 636*; A propos du Pérou. F. Clément-Simon, 153*; Remarks on Arbitral Sentence . . . Boundary Question between Bolivia and Peru. P. Fiore, 800*; Some Results of Recent Anthropological Exploration in. Dr. A. Hrdlička, 619; Ruins of Choquequirau. H. Bingham, 476*; Temblores en el Perú en 1906, 790*; Yale Expedition to. Prof. H. Bingham, 287; Yale Expedition of 1911, 685 ¶Economic: Cotton Industry. W. S. Lorrie, 153*; Cotton Production of. J. A. Lavalle y Garcia, 715*; Estadística Minera en 1908. C. P. Jimenez, 67*; Guano Industry, 636*; Industrial and Productive Life of, 685; Irrigation of the Coast of. C. W. Sutton, 715*; Petroleum Industry. F. E. Ross, 555*; Production of Rubber in. C. Romero and F. E. Ross, 636*; Sugar Industry, 395* ¶Historia de las Guerras Civiles del Perú (1544-1548) y de Otros Sucesos de las Indias. P. Gutiérrez de Santa Clara, *n.*, 946 ¶Maps of Peru: ¶Departamento de Cajamarca. F. Malaga Santolalla y C. Vallejos, 547*; — de Loreto corregido y aumentado con los estudios de los Srs. Espinar, Buenaño, y otros, *n.*, 547; Mapa que comprende las últimas exploraciones y estudios verificados, 78*
- Pervinière, L. Le Sud Tunisien, 314*
- Petermann, August: Ein Beitrag zur Geschichte der geographischen Entdeckungen und der Kartographie im 19. Jahrhundert. Dr. E. Weller, *rev.*, 845
- Petermanns Mitteilungen, Globus merged with, 138
- Peters, Dr. C. Archæological Discoveries in South Africa, 55
- Peters, W. J., joint author, see Dr. L. A. Bauer.
- Petersen, J. Unperiodische Temperaturschwankungen im Golfstrom und deren Beziehung zu der Luftdruckverteilung, 317*
- Petitot, E. Dates importantes pour l'histoire de la découverte géographique du Canada, 554*
- Petrie, W. M. F. Arts and Crafts of Ancient Egypt, *rev.*, 206
- Petroleum: ¶Exploitation du Pétrole. Historique—Extraction—Géographie et Géologie, etc. L. C. Tassart, *rev.*, 147; The Story of Oil. W. S. Tower, *rev.*, 146
- Petterd, W. F. Minerals of Tasmania, 871*
- Peucker, Dr. K. Höhenschichtenkarten. Studien und Kritiken zur Lösung des Flugkartenproblems, *rev.*, 465
- Pfälzerwald. D. Häberle, 952*
- Pfaundler, Dr. R. Verbreitungsgebiet der deutschen Sprache im Südgarn, (Map), 878*
- Phalen, W. C., and L. Martin. Mineral Resources of Johnston, Pa. and Vicinity, 553*
- Philadelphia, Growth and Extent of Textile Industries of. J. J. Macfarlane, 789* ¶Map: Philadelphia Water Front, Schuylkill R., Chart U.S. Coast and Geod. Surv., 631*
- Philadelphia Commercial Museum, Its Bureau of Foreign Trade, 789*
- Philippine Islands: ¶Essential Fea-

- tures of Geology of —. W. D. Smith, 557*; États-Unis et les —. H. Marchand, 948*; The Discoverer of the Philippines. J. D. Champlin, 587; *Erratum*, 862; *Iti Dalan Ti Santa Nga Kruz* [Ilokonon Dialect]. (The way of the Holy Cross). F. C. Meredith, *Editor*, 880*; Philippine Islands. R. R. Lala, 400*; Philippine Types. R. B. Bean, 397*; Negrito and Allied Types in. D. P. Barrows, 397*; Types of Negritos. R. B. Bean, 477*; Progress and Problems in the. Rev. C. H. Brent, 477*; Racial Anatomy of Islanders. R. B. Bean, *rev.*, 783; Reports of Philippine Commission, 1910, 870*; of Secretary of the Interior, 1910, 870*; of Secretary of Public Instruction, 1910, 870*; Seismic Centers of Samar, Leyte, and E. Mindanao. Rev. M. Saderra Masó, 557*; Eruption of Taal Volcano. Abridged from paper, by W. E. Pratt, 903; Visit to the. G. Vassal, 397* ¶ Climatic: Annual Report of Director of the Weather Bureau, for 1908, 870*; Meteor. Observations . . . 1906, *Annual Report* Weather Bureau, 638*; New Meteorological Observatory, 137 ¶ Economic: Bureau of Customs, Report Philippine Comm., 1910, 870*; Conservation policy for the. Dr. D. P. Barrows, 477*; Economic Possibilities of Mangrove Swamps. R. R. Williams, 951*; Gold Deposits of. H. G. Ferguson, 638*; Growth of Manila Hemp Industry, 527; Mineral Resources with Statement . . . Commercial Mineral Products for 1909, 315*; Natural Dyes and Coloring Matters of the. B. T. Brooks, 718*; Philippine Firewood. A. J. Cox, 951*; Report of Secretary of Commerce and Police, 1910, 870* ¶ Maps of Philippine Islands: Geologic Map of — Islands, *n.*, 472; Principal Mineral Districts and Distribution of Known Coal Fields, 472*; Map showing Relation of Recent Vulcanism to Principal Tectonic Lines, *n.*, 472; Sketch Map of the Taal Volcano Region, 957*; Sulu Island, 472*; Charts U. S. Coast and Geod. Survey: Albay Gulf and Part of Lagonoy Gulf, E. Coast of Luzon, 545*; Anchorage, Verde Island Passage to Cuyo, 631*; Cebu Harbor, S. W. Luzon and Mindoro, Passage between Luzon and Masbate, Manila Bay, S. Part Samar, W. Bohol, 158*; Guiuan Harbor, South Coast of Samar, 875*; Harbors in Negros and Vicinity, 9 Charts, 632*; Inland Waters South of Luzon, Ragay Gulf to Tayabas Bay, 309*; Mangarin and Pandaroch-an Bays, 875*; Mindoro, North Coast, Port Gallera and Varadero Bay, 76*; Negros and Cebu. Northern part of Tañon Strait, 309*; Panay, Negros and Cebu with parts of Bohol and Masbate, 309*; N. E. Panay and Adjacent Islands, 875*; Samar and Leyte. Calbayog to Tacloban, 309*; Philippine Islands; *n.*, 76, Sketch map of Gen. Progress, Rep. 1909-10, 470*; West Coast of S. W. Luzon, 158, Manila Bay to Candon Point, 309*; Sulu Archipelago, 545* Philippson, A. Geol. Karte des westlichen Kleinasien, 708*; Reisen und Forschungen in westlichen Kleinasien. Das westliche Mysien und die pergamenische Landschaft, 951*; map, *n.* 548 Phosphates: Our greatest Plant Food. G. E. Mitchell, 317* Physical Geography. See under Geography. Physiography: ¶ Elementary —. R. D. Salisbury, *rev.*, 386; Physiographical Introduction to Geography. A. J. Herbertson, *n.*, 219; Physiography in the High School. R. D. Salisbury, 399* Piedmont, Narrative of Excursion to the Mountains of — and Researches among the Vaudois, etc. W. S. Gilly, 238*; Notes of a Tour in the Valleys of — . . . 1854. B. W. Noel, 238* Pierce, F. A. Sponge Industry of the Americas, 553* Pierson, A. H. Consumption of Firewood in U. S., 151* Pietsch, Dr. W. Abflussgebiet des Nil, 637* Pietschmann, Dr. V., Studie zu —'s photogrammetrischen Aufnahmen in Mesopotamien. I. Tschamler, *n.*, 960 Pietukhov, N. Colonists of Novaya Ziemla in 1910, 719*; Northern Island of Novaya Ziemla. New Station. [In Russian], 793* Pilcomayo, Rio. Carte de la région des marais du — et du Rio Confuso. A. Schmied et Arnold, 67* Pilgrim Fathers, History of the Puritans of England and the W. H. Stowell and D. Wilson, 239* Pillado, R. Meat Industry of Argentine Republic, 314* Pinchot, G. Fight for Conservation, *n.*, 388 Pirsson, L. V. Petrography of Tripyramid Mountain, 789* Piscicelli, Capt. M. Sul Lago Bangueolo, 68*

- Pishel, M. A., *joint author*, see J. S. Diller.
- Pittier, Prof. H. F., *Investigations in Panama*, 524
- Pittsburg District, Pa., *Map showing principal Areas of Gravel Deposits in*, 229*
- Place Determinations: *Theorie der astrographischen Ortsbestimmung*. Dr. L. de Ball, 72*
- Place Names, *Regional Peculiarities in*. R. H. Whitbeck, 273
- Place, T. A. J. *Cotton Cultivation: Prospects in Transvaal*, 555*
- Planet-Expedition, *Tiefsee-Forschungen der-* (1906-7). Dr. W. Brennecke, 72*; —. Dr. W. Brennecke, Dr. Gräf, und Dr. Krämer, *n.*, 212
- Plankton, *Résumé des Observations sur le — des Mers explorées par le Conseil . . . 1902-8*, 318*
- Plant-Animals. F. Keeble, *n.*, 947
- Plants: ¶ *Beiträge zur Kenntnis der Höhengrenzen der Vegetation im Mittelmeergebiet*. Dr. M. Koch, *n.*, 933; *On the Collection of Dried Plants obtained in S. W. Africa by Percy Sladen Memorial Exp.*, 1908-11. H. H. W. Pearson, 717*; *Zur Düngung der tropischen Kulturpflanzen*. Prof. Dr. Fesca, 317*; *Relation of Climate to Cranberry Growing*. H. J. Cox, 196; *Early Spring Aspects of Coastal Plain Vegetation of South Carolina, Georgia, and N. E. Florida*. R. M. Harper, 948*; *Einfluss der klimatischen Faktoren auf die Vegetation im allgemeinen und speziell auf die Höhe des Pflanzenertrages*. Dr. P. Vageler, 872*; *Introduction of economic plants into Queensland*. J. F. Bailey, 225; *Nouvelles recherches sur la distribution florale*. Dr. P. Jaccard, 74*; *Pflanzenbau in den Tropen und Subtropen*. Prof. Fesca, *n.*, 937; *Südpolar-Land in seinen Beziehungen zur Verbreitung der Pflanzen und Tierre*. M. Alsberg, 952*; *Zur Verbreitung einiger Nutzpflanzen*. Dr. F. Höck, 952*
- Plassmann, Prof. J. *Meteorbeobachtungen auf See*, 794*
- Plata, La. *Museum of*. Rev. C. W. Currier, 636*
- Platania, G. *Ricerche oceanografiche Norvesesi*, 317*; *Stromboli*, 71*
- Playfair, Maj. A. *The Garos*, *rev.*, 65
- Pleistocene Glaciation: *See under Glaciers*.
- Plenty River and Anderson Creek, Warrandyte, Victoria, *Contribution to Physical History of*. J. T. Jutson, 226*
- Plum Island to Stratford Shoal, *Chart U. S. Coast and Geod. Surv.*, 158*
- Plymouth, Kingston and Duxbury Harbors, Mass., *Chart U. S. Coast and Geod. Surv.*, 875*
- Pösch, Dr. R. *Erdkarte des Ausbreitung der Pest am Ende des 19 u. Anfang des 20. Jahrh.*, *n.*, 473; *Meine Beide Kalahari Reisen 1908-09*, 396*; *Postkarte der Mandschurei*, 472*
- Pohlig, H. *Aus dem Märchenlande von 1001 Nacht. Beobachtungen . . . eines Geologen in nördlichen Persien*, *rev.*, 931
- Point au Fer to Marsh Island, La., *Chart U. S. Coast and Geod. Surv.*, 631*
- Polakowsky, Dr. H. *Von der chilenischen Längsbahn*, 153*
- Polar Regions. *See also Arctic and Antarctic*: ¶ *Über den Begriff Inlandeis, nebst Bemerkung über die Schneegrenze in den polaren Ländern*. Dr. E. Werth, 639*; *Klima der Gemässigten- und Polarzonen*. J. Hann, *rev.*, 935; *Organisation générale de l'Institut Polaire International*. G. Lecomte, 872*; *Project of a Spanish Expedition*, 859; *Polar Exploration*. W. S. Bruce, *rev.*, 785; *Polarforschung im geographischen Unterricht*. Dr. F. Schulze, 228* ¶ *Mans of Polar Regions: Map of South Polar Regions*. Dr. D. Mawson, *n.*, 712; *Polar Regions showing Routes and Explorations of R. E. Peary, 1892-1906*, 712
- Pole, North: ¶ *The North Pole. Its Discovery in 1909*. R. E. Peary, *rev.*, 214; *Peary Arctic Club Expedition to the — 1908-9*. R. E. Peary, 72* ¶ *Map: Die wichtigsten Nordpolarreisen des XIX und XX Jahrhunderts . . . besonderer Berücksichtigung derjenigen . . . Erreichung des Pols war*. P. Sprigade u. M. Moisel, *n.*, 234
- Polis, Dr. *Luftdruckverteilung über dem Atlantischen Ozean und Bedeutung der drahtlosen Telegraphie für Erweiterung der täglichen Wetterkarten*, 74*
- Pollacchi, Com. P. *Alphabets en usage dans les principales langues . . . Europe centrale et les Balkans . . . transcription phonétique*, 226*
- Polynesia: ¶ *Cannibalism in*. A. P. Rice, 156*; *Trois Archipels de la Polynésie orientale. Samoa; Îles sous le Vent; Marquises*. R. La Bruyère,

- 638*; Polynesians and Melanesians. G. Brown, *rev.*, 463
- Polynesians, Malayo —: Grundlinien einer Vergleichung der Religionen und Mythologien der austronesischen Völker. P. W. Schmidt, 72*
- Polynesian Wanderings. Tracks of Migration Deduced from an Examination of Proto-Samoan Content of Efaté and other Languages of Melanesia. W. Churchill, *rev.*, 265
- Polynoff, B. On Perpetual Congelation and Forms of Ice in the Amur Region. [In Russian], 224*
- Pomerania, Maps: Grösse und Lage der Wohnplätze von Neu-Vorpommern und der Insel Rügen. Dr. E. Müller, 710*; Sturmflut vom 30/31. Dez., 1904 an der Küste Pommerns. Dr. G. Krüger, 710*; Volksdichtekarte von Neu-Vorpommern und der Insel Rügen. Dr. E. Müller, 710*
- Ponty, Gov.-Gen. Situation générale de l'Afrique Occidentale française, 68*
- Poona and Deccan, Our Troubles in. A. Crawford, 319*
- Poor, C. L. Nautical Science in its Relation to Practical Navigation, together with Study of Tides and Tidal Currents, *rev.*, 469
- Popocatepetl. F. L. Waldo, 636*; Excursion a la Caverna de Cacahuamilpa y Ascension al Crater del —. E. Landensio, 236*
- Population, World: Bevölkerung der Erde und ihre Verteilung nach dem Geschlecht. S. Gulischambarov, 559*
- Port-Adelaide, 156*
- Porter, R. P. Dangers of Municipal Trading, *n.*, 943
- Porter, R. W. Map of Yentna Mining District, Alaska, 795*
- Portland Canal District. R. G. McConnell, 949*
- Port Nolloth (Südafrika), 396*
- Portolan Charts, Atlas of. Edited by Dr. E. L. Stevenson, 530
- Porto Maurizio, S. Remo and —. Map, *n.*, 311
- Porto Rico: ¶ Climate of. O. L. Fassig, 790*, 524, 868*; Education in. Hon. Edwin G. Lindsay, 636*; Rainfall. Dr. O. L. Fassig, 448; Report of Commissioner of Education, 1910, 868*; Report of Commissioner of the Interior, 1910, 868*; Tenth Annual Report of the Governor of, 868* ¶ Maps of Porto Rico: Average Annual Extremes of Temperature, 470*; Average Annual Rainfall, 470*; General Progress Sketch, 1909-10, 470*; Mean Annual Temperature and Prevailing Direction of Winds, 470*; Road and Railroad Map of, 632*; Charts U. S. Coast and Geod. Survey: San Juan Passage to Port Humacao and western part of Vieques Island, 309*; Mayaguez Bay and Approaches, 545*
- Port Royal Sound and Savannah River, Chart U. S. Coast and Geod. Surv., 76*
- Port Saïd, 154*
- Ports: Ports germaniques et ports latins, 559*; Seestädte der Erde nach ihren Leistungen im Schiffsverkehr und im Wertumsatz. Dr. A. Oppel, 479*
- Portugal, Présentation d'une carte hypsométrique du — et notice explicative. P. Choffat, 71*
- Portuguese India. See under India.
- Port Wells, Prince William Sound, Glaciers of. U. S. Grant and D. F. Higgins, 321
- Porumbaru. Commission européenne du Danube, 226*
- Posen: Zur Verbreitung und Entstehung der Posener Seen. H. Schütze, 639* ¶ Maps of Posen: Provinzen — und Westpreussen unter besonderer Berücksichtigung der Ansiedlungsgüter, Staatsdomänen, Staatsforsten 1911, 798*; Die räumliche Entwicklung Posens, 958*
- Potonié, H. Zur Genesis der Braunkohlenlager der südlichen Provinz Sachsen, 558*
- Potosí. Prof. H. Bingham, 1
- Pouchet, F. A. Universe, or the Wonders of Creation, 320*
- Poughkeepsie Quadrangle, Geology of. C. E. Gordon, 867*
- Pourquoi Pas? Dr. Charcot presents his vessel to the Department of Public Instruction, 60
- Powder River Coal Field, Wyo. R. W. Stone and C. T. Lupton, 151*
- Powell, E. T. Industrial Development of Canada, 554*
- Powell, F. W., *joint author*, see F. A. Cleveland.
- Powers, L. D. Report of the Sixteenth Annual Meeting, Lake Mohonk Conference on Intern. Arbitr., 1910, 318*
- Pratt, W. E. Eruption of Taal Volcano (abridged), 903
- Pretoria District, Sketch Map showing approximate positions of Kimberlite occurrences in the, 956*
- Prichard, H. H. Across Labrador from Nain to George or Barren Grounds River, 152*
- Prince Charles Foreland, Scottish Ex-

- ploration in — 1906-7. W. S. Bruce, 872*
- Prince Edward Island, Map: Prince Edward Island, Nova Scotia and New Brunswick. R. E. Young, 78*
- Prince William Sound: ¶ Glaciers of —. U. S. Grant and D. F. Higgins, 326, 401; Mining and Prospecting in Prince William Sound in 1909. U. S. Grant, 151*
- Principe, Manual Labour in São Thomé and —. F. Mantero, *rev.*, 535 ¶ Map of Principe: Carta da Ilha do — com a divisão das principaes explorações agrícolas, *n.*, 708
- Prindle, L. M., and F. J. Katz. Geol. Map of Fairbanks District, Alaska, 795*; see also A. H. Brooks, *joint author.*
- Privat-Deschanel, P. En Australie: La Nouvelle-Galles du Sud, 397*
- Prittitz u. Gaffron, Maj. von. Skizze von Unjangwira und den Nachbarlandschaften, *n.*, 797
- Providence Harbor, R. I., Chart U. S. Coast and Geod. Surv., 76*
- Provincetown Harbor, Charts U. S. Coast and Geod. Surv., 158*, 875*
- Prussia: ¶ Beobachtungen über Diluvium, Tertiär und Kreide in Ostpreussen. F. Kaunhowen, 558*; Jahrbuch der Königlich Preuss. Geol. Landesanstalt zu Berlin, 1907, 1908, 558*; 1910, 793*; West-Masuren. Dr. C. Koh, *n.*, 144 ¶ Maps of Prussia: Geol. Übersichtskarte der Warburger Störungzone, 958*; Glacial geology of the region between the Elbe and Lübeck, 958*; Posen und Westpreussen unter besonderer Berücksichtigung der Ansiedlungsgüter, Staatsdomänen und Staatsforsten, 1911, 798*; Übersicht der veröffentlichten Messischblätter, 798*
- Puget Sound Basin, Climate of. Prof. E. J. Saunders, 619; Terminal Moraine of Puget Sound Glacier. J. H. Bretz, 714*
- Pullar, L., *joint author*, see Sir John Murray.
- Pullé, Dr. G. Fenomeni idrologici e climatologici nel bacino della Senna, 559*
- Pulliam, W. E. Dominican Cacao, 395*
- Puls, E. Vergleichende Untersuchungen über Flusssichte, *n.*, 705, 720*
- Puna, Region de la. Demarcación de Límites con Chile. Mapa prel. Z. Sánchez and T. Loos, 955*
- Punjab: Lakes of the Salt Range. T. H. D. LaTouche, 225*
- Purcell Range of British Columbia, Across the. Dr. T. G. Longstaff, 868*, Map, 633*
- Purdue, A. H. Collecting Area of Waters of hot springs, Hot Springs, Ark., 151*; Recently Discovered hot springs in Arkansas, 867*; see also E. F. Burchard, *joint author.*
- Puritans, History of the — in England, and the Pilgrim Fathers. W. H. Stowell and D. Wilson, 239*
- Puys, Migration de la ligne de partage des eaux dans la chaîne de. Ph. Glangeaud, 638*
- Pygmies: Stellung der Pygmäenvölker in der Entwicklungsgeschichte des Menschen. P. W. Schmidt, 479*
- Pyrenees: ¶ Letters from the Pyrenees during . . . 1842. T. C. Paris, 239*; Observations, Moral, Literary, and Antiquarian . . . Tour through the —, South of France, etc., 1814-15. John Milford, Jun., 238*; Pau and the —. Count H. Russell, 320*; Travels in the Pyrenees, etc. Ramond [L. F. E. de Carbonnières]. Translated by F. Gold, 239*; Variations périodiques des glaciers, 1909. Alpes françaises et Pyrénées. C. Rabot, 558*
- Pyrénées, Hautes. See Hautes-Pyrénées.

Q.

- Qualtrough, K. Fascination of Geography, 794*
- Quebec: ¶ Le chemin de fer de Matane et Gaspé. N. Le Vasseur, 715*; Une expédition dans l'Abitibi. F. La-liberté, 715*; Geologic Reconnaissance along the line of National Transcontinental R.R. in western —. W. J. Wilson, 949*; Logging Operations. B. Winegar, 152*; Northwestern — adjacent to Interprovincial Boundary and the National Transcontinental R.R. M. E. Wilson, 949*; Paroisse de St. Romuald d'Etchemin. L'abbé B. Demers, *n.*, 924; Raised Beaches of southern —. J. W. Goldthwait, 949*; La Richesse forestière de la province de Québec. Hon. J. Al-lard, 554*; Serpentine Belt of Southern —. J. A. Dresser, 948* ¶ Maps of Quebec: Carte régionale, comprenant les Comtés de Témiscouata, Kamouraska, etc. A. M. Taché, 633*; Carte régionale . . . comprenant les Comtés de St. Maurice, Maskinonge, Berthier, etc. A. M. Taché, 633*; La Vallée du Lac Saint-Jean, 634*

Quebracho, Beiträge zur Kenntnis des — gebietes in Argentinien und Paraguay. Dr. R. Lütgens, 715*

Queensland: ¶ Bananas in Tropical, 289; Certain Mines and Minerals in North. L. C. Ball, 557*; Coal Measures of South East Moreton. E. O. Marks, 557*; Field Notes on Mount Flora Gold and Mineral Field. L. C. Ball, 557*; Flower-Hunter in — and New Zealand. Mrs. Rowan, 319*; Introduction of Economic Plants into. J. F. Bailey, 225*; Some Mineral Fields on the Hinterland of Mackay: Mount Spencer, etc. L. C. Ball, 557* ¶ Maps of Queensland: Geol. Map of South East Moreton Coal Measures, 310*; Geol. Sketch Map of Northern Part of Annan R. Tin Field. L. C. Ball, 311*; Sketch Map of N. E. Australia showing Area with Flowing Wells and the Distribution of supposed Intake Beds in, 798*; Sketch Map of East Central —. Gold Mineral and Coal Fields, between Rockhampton, Gladstone and Dawson and Mackenzie Rivers. W. H. Greenfield, 311*

Quelle, Dr. O. Personal, 529

Quiggin, A. H., *joint author*, see A. C. Haddon.

Quin, M. J. Steam Voyages on the Seine, the Moselle & the Rhine with Railroad Visits to . . . Cities of Belgium, 239*

Quirigua. V. M. Cutter, 554*

R.

Rabot, C. Afrique Occidentale Française: Le Commerce en 1909, 314*; Découverte de gisements de glace fossile à la Nouvelle-Zemble et au Spitzberg, 479*; Recul du pin sylvestre dans les montagnes de la Suède, 719*; Revue de Glaciologie, 317*; Variations périodiques des glaciers, 1909. Alpes françaises et Pyrénées, 558*

Radcliffe, W. (*Translator*). Journey through Sweden . . . particulars relating to History of Denmark, etc. Written in French by a Dutch Officer, 1790, 239*

Radford, H. V. Expedition in northern Canada, 134, 777

Radomir-Küstendil, Situationsplan der Eisenbahnstrecke — in Bulgarien, 79*

Rae, W. F. Westward by Rail: The New Route to the East, 400*

Railroads. See also Transportation: ¶ America: Pan American Railway, 313*; Unternehmen der panamerikanischen Bahn. R. Hennig, 313* ¶ North

America: Chemin de fer de Matane et Gaspé. N. Le Vasseur, 715*; Comparison of Trans-Appalachian R.Rs. A. E. Parkins, 314*; Economic Phases of Railroad Rate Controversy. A. M. Sakolski, 317*; Progress of the Grand Trunk Pacific R.R., 917; Annual Report Statistics for 1909, 394*, for 1910 (U. S.) Compared with Official Rep. for 1909 and Recent Stat. of Foreign Railroads, 554*; Hudson Bay Railroad, 152*; New Transcontinental R.R., 519; Earning Power of Railroads, 1909. Compiled by F. W. Mundy, *n.*, 218 ¶ Map: Sketch Map of Part of Railway Belt, British Columbia, 230* ¶ Central and South America: Von der chilenischen Längsbahn. Dr. H. Polakowsky, 153*; Développement de chemins de fer au Brésil, 395*; Ferrocarril de Guaira a Caracas. J. Flind, 636*; Guatemalan Railroad Construction. E. F. Tisdell, 395*; Madeira-Mamoré R.R. P. H. Ashmead, 636*; Territoire fédéral l'Acre et la ligne du Madeira au Mamoré. P. Walle, 636* ¶ Maps: État actuel des voies ferrées dans l'Amérique Centrale, 634*; Map of railways of Argentina in 1909, 231* ¶ Africa: Achèvement du chemin de fer de la Guinée française. Océan relié au Niger, 68*; Guinée Française: Chemin de fer et Progrès. E. Salesses, 154*; Chemin de fer de Guinée française. A. Arcin, 716*; Chemin de fer de Konakry au Niger. A. Terrier, 154*; Chemins de fer nationaux vers le Katanga. L. Goffin, 153*; Le "Livre gris" sur la question des chemins de fer du Congo, 791*; Matadi-Leopoldville R.R., 620; East African Central R.R., 368; Extending the Sudan R.R., 54; Zur Geschichte der äthiopischen Eisenbahnen. A. Ilg, 67*; Unsere Kameruner Eisenbahnen. E. Walter, 314*; Kameruner Südbahn, 396*; Madagascar R.R., 620; Railway Projects in South Africa, 155*; Railroads in West Africa, 54; Le Transafricain de Matadi à Dar-Es-Salam. A. J. Wauters, 716*; Le Transcongolais, 791*; Transkontinentale Bahnen und die Kap-Kairo-Linie. Dr. R. Hermann, 153*; Vallée de la Lrkuga et le chemin de fer du Tanganika. A. Delcommune, 790*; Verbindungswegen zwischen Deutsch-Südwestafrika und Betschuanenland Eisenbahn. F. Seiner, 154* ¶ Maps: Carte du Réseau complet des chemins de fer projetées en Afrique Occiden-

- tale Française, 797*; Chemin de fer de Guinée et ses rapports économiques avec le Cours du Niger, 956*; South Africa, showing railways, *n.*, 79
- ☞ Asia: Afghanische Bahnprojekt. Dr. E. Zugmayer, 155*; Aspect présent de la question du Bagdad. R. de Caix, 637*; Bagdadbahn, 637*; Chemin de fer du Siam, 792*; Chemin de fer du Yunnan. J. Rodes, 792*; Ferrovie della Mancuria e l'Accordo Russo-Giapponese. E. Catellani, 224*; Au pays du chemin de fer de Bagdad. H. Viollet, 951*; Emprunt pour les chemins de fer Hankéou-Canton et Hankéou-Seu-Tchouan, 951*; Le progrès du Transsibérien. P. Labbé, 224*; The proposed Trans-Persian R.R. Lieut.-Col. A. C. Yate, 717*
- ☞ Europe: Jahres-Bericht der K. Bayer. Staatseisenbahn Verwaltung, 1909, 398*. ☞ Maps: Mitteleuropäische Eisenbahnnetz beim Ausbruch des deutsch-französischen Krieges, 710*; Situationsplan der Eisenbahnstrecke Radomir-Küstendil in Bulgarien, 79*
- Raimondi, Itinerario de los viajes de — en el Perú, 715*
- Rain: ☞ Beziehungen zwischen Regenfall u. Quellergiebigkeit, usw. Dr. L. Frank, 871*; British Isles. Mean Annual Rainfall. Dr. H. R. Mill, *n.*, 551; British Rainfall, 1908 und 1909. Dr. H. R. Mill, *rev.*, 539; Über die extremen Schwankungen des Regenfalls. Dr. G. Hellman, 73*
- Ramírez, José Fernando. Mexico durante su Guerra con los Estados Unidos. Documentos inéditos . . . pub. por G. García, 480*
- Ramond [de Carbonnières, L. F. E.]. Travels in the Pyrenees, etc., translated by F. Gold, 239*
- Rampal, A. Lorraine française et Lorraine allemande, 478*
- Randall-MacIver, D., *joint author*, see C. L. Woolley.
- Rane, F. W. Reforestation in Massachusetts, 789*
- Range, Dr. P. Deutsche Süd-Kalahari, 869*; Das Lüderitzland, 716*
- Rappahannock River, Charts U. S. Coast and Geod. Survey, 158*, 545*, 631*
- Raritan River. From Raritan Bay to New Brunswick, Chart U. S. Coast and Geod. Surv., 309*
- Rasser, Dr. E. O. Waldbrände und die Möglichkeit ihrer Bekämpfung, 872*
- Rathbun, M. J., H. Richardson, *et al.* Crustaceans (Harriman Alaska Series), 480*
- Ray, J. Collection of Curious Travels and Voyages, 320*
- Reck, H. Glazialgeologische Studien über die rezenten und diluvialen Gletschergebiete Islands, 793*; Übersichtskarte der Gletschergebiete von Island, 711*
- Record, Geographical, 51, 130, 195, 283, 365, 447, 518, 618, 685, 775, 854, 916
- Reed, J. H. Cotton-Growing within the British Empire, 792*; Geographical Aspects of the Problem of Empire Cotton Growing. J. H. Reed, 399*
- Reed, W. G., Jr. Study of Phenomenal Climatology, 372
- Reed, W. J., *joint author*, see J. A. Taff.
- Reeds, C. A. Report on Geological and Mineral Resources of Arbuckle Mts., Okla., 880*
- Reeves, E. A. Maps and Map-Making, *rev.*, 213; Note on Map of S. Peru and N. Bolivia, 395*
- Refrigeration: Resultados obtenidos en el Segundo Congreso Internacional del Frio. E. Frers, 873*
- Reichard, A. C. Hydrographische Beobachtungen der schwedischen Expedition nach Spitzbergen, 872*
- Reichert, Dr. F. Forläufiger Bericht über die Resultate der Juncal-Expedition in den Anden, 868*; Penitenteschneefelder im Gebiet zwischen Aconcagua und Tupungato, 475*
- Reid, H. F. Variations of Glaciers, 318*; Variations périodiques des glaciers. XV Rapport 1909. États-Unis [in English], 635*
- Reid, J. A. Geomorphogeny of the Sierra Nevada Northeast of Lake Tahoe, 553*
- Reid, R. L. Chart of River Aruwimi, 797*
- Rein, G. K. Anglo-Aegyptischer Sudan, 153*; Englische Bewässerungsanlagen in Aegypten und im Sudan mit besonderer Berücksichtigung des Assuan-Staudammes, usw., 395*
- Reinecke, L. Beaverdell District, B. C., 949*
- Reinhard, A. v. Zur Lage der Schneegrenze im Kaukasus, 871*
- Rendle, A. B., *joint author*, see W. Fawcett.
- René-Leclerc, Ch. Commerce extérieur du Maroc (1909), 790*; La situation économique du Maroc, en 1908-09, 476*; — de Tétouan, 716*

- Renfors, A. Finnish Self-Taught. Thimm's System, *n.*, 149
- Reno Region, Nev., Geology and Oil Prospects in. R. Anderson, 474*
- Renty, E. de. L'Angleterre en Afrique, *n.*, 781; Chemin de fer dans la Somalie italienne, 716*
- Réunion: ¶ Statistiques du Commerce pour l'année 1908, 791*; La Réunion, 316*
- Reviews and Notices, 61, 139, 205, 295, 373, 455, 531, 625, 693, 781, 863, 923
- Révil, J. Glaciations des Alpes françaises, 477*
- Rhine Province: ¶ Städte des rheinisch-westfälischen Industriebezirks. Dr. K. Olbricht, 398*
- Rhine: ¶ Am Ursprung des Rheins. O. Rögner, 871*; Rhine and Mississippi R. Terminals. E. J. Clapp, 714*
- Rhodes, Cecil. His Private Life. P. Jourdan, *rev.*, 536
- Rhodesia: ¶ Rhodesia. A. R. Colquhoun, 68*; A Geyser in South Africa. Prof. P. D. Hahn, 717*; Progress of, 155*; Rhodesia Notes, 68*
- Northeast Rhodesia: Sul Lago Bangueolo. Capt. M. Piscicelli, 68*
- ¶ Map: Sketch Map of Southeast Corner of Bangweulu Swamps inhabited by Wa-Unga, showing channels connecting the Chambeshi and Luapula Rivers. F. H. Melland, 956*
- Southern Rhodesia: Agricultural Labor Conditions in. H. M. Hole, 476*; Viktoriafälle des Sambesi und ihre Umgebung. J. Brunnthaler, 717*
- Rhône, Essai sur les Glaciers et sur le terrain erratique du bassin de. J. de Charpentier, 238*; Navigation actuelle du Rhône, ses améliorations possibles et leur influence au point de vue du commerce international. P. Clerget, 793*
- Ricard, F. Transformations de Tunis sous le Protectorat français, 155*
- Ricco, A. Rôle de l'eau dans les phénomènes éruptifs, 74*
- Rice, A. P. Cannibalism in Polynesia, 156*
- Rice, H. Forschungsreise des Dr. — im Flussgebiet des Rio Caiary-Uaupés. T. Koch-Grünberg, 950*
- Rice, Prof. W. N. Geological and Natural History Survey of Connecticut, 521
- Rich, J. L. Physiography of Bishop Conglomerate, S. W. Wyo., 66*, 133
- Richard, J. Campagne scientifique de la Princesse-Alice. Liste des Stations, 399*
- Richards, R. W. Central Part of Bull Mountain Coal Field, Mont., 221*; — and J. H. Bridges. Sulphur and Pyrite, 789*; see also H. S. Gale, *joint author*.
- Richardson, G. B. Trinidad Coal Field, Col., 151*
- Richardson, H., *joint author*, see M. J. Rathbun.
- Riedel, J. Neue Studien über Isochronenkarten, 953*
- Ries, H. Clay and Shale Deposits of Western Canada, 949*; Economic Geology, *rev.*, 219
- Rieznichenko, Bl. Glacial Group of Muss-Tau. [In Russian], 224*
- Riggs, Prof. A. S. Lecture on Sicily and Southern Italy, 283
- Rio de Janeiro: ¶ La métamorphose de la capitale du Brésil. F. A. Georgette, 790*; *Boletim* mensal do Observatorio de Rio de Janeiro [full tables of meteor. observations, April-Dec., 1908], 152*; Le port de — et ses travaux d'amélioration. Comm. G. Bourge, 868*
- Rio Grande. Stream Waters of Western U. S., with chapters on Sediment carried by the — and Industrial Application of Water Analyses. H. Stabler, 948*
- Rio Grande do Sul, Navegação na costa do. A. Alves Dos Santos, 715*
- Rio Pilcomayo, Carte de la région des marais du — et du Rio Confuso. A. Schied et Arnold, 67*
- Ripley, W. Z. European Population in the U. S., 474*
- Riso Patron, L. Republica de Chile (Maps), *n.*, 159
- Ritz, H. B. Speech of Tasmanian Aborigines, 226*
- Rivers: ¶ Écoulement fluvial et dénudation, d'après les travaux de l'U. S. Geol. Surv. H. Baulig, 560*; Gliederung der Flusseises und die Arten seiner Erscheinungen, 318*; Vergleichende Untersuchungen über Flussdichte. E. Puls, 720*
- Rivet, Dr. P. Recherches anthropologiques sur la Basse-Californie, 635*
- Roanoke R. Drainage Basin, 475*
- Robb, J. Hampden, *Obituary*, 294
- Robertson, A. Bryozoans (Harriman Alaska Series), 480*
- Robertson, A. W. D., *joint author*, see R. J. A. Berry.
- Robertson, Dr. J. W. Conservation of Agricultural Resources [Canada], 554*
- Robinson, E. Van Dyke. Commercial Geography, *rev.*, 384
- Robinson, H. H. Single Cycle De-

- velopment of Grand Canyon of the Colorado, 948*; see also H. E. Gregory, *joint author*.
- Robson, Mount, Attempt on. L. S. Amery, 222*
- Rock Springs Coal Field, Wyo., Southern Part of. A. R. Schultz, 151*
- Rocks: ¶Pre-Cambrian Rocks of Bow River Valley. C. D. Walcott, 222*
 ¶Maps of Rocks: Dessin-modèle du rocher en haute montagne: le Cirque du Creux Noir (Vanoise), *n.*, 960;
 Map of Southern Appalachian Valley, showing Outcrops of Ordovician Rocks, 954*; Sketch Map of Four Great "Rock-groups" of the Alps. After Prof. Steinmann, 798*
- Rockwell, F. I. White Pines of Montana and Idaho—Their Distribution, Quality and Uses, 867*
- Rocky Mountains: ¶Highways and Byways of. C. Johnson, *rev.*, 373;
 Rambles in the. M. O'Connor Morris, 400*; Streifzüge in den Rocky Mountains. C. L. Hennig, 474*
- Rodes, J. Chemin de fer du Yunnan, 792*
- Rodríguez, J. Galbiss y. Ensayo de los Métodos fotogramétricos en el Término municipal de Otero de Herberos (Provincia de Segovia), 960*
- Röger, J. Bergzeichnung auf den älteren Karten, 480*
- Rogers, W. Raised Beaches and Head of the Cornish Coast, 316*
- Rögnér, O. Am Ursprung des Rheins, 871*
- Romani, J. F. Carta de la región abarcada por el temblor del 26 de Marzo de 1908 [Mexico], 159*
- Rome: The Streets of. Contessa Gautier, 793*
 ¶Maps of Rome: Dintorni di Roma, *n.*, 393; Exhibit of Plans of, 688; Pianta di Roma, *n.*, 393
- Romer, Prof. E. von. Flüchtige Reiseeindrücke aus dem Innern und von den Rändern Asiens, 637*
- Romero, A. A. Estudio geológico de nuestro continente [South America], 950*
- Romero, C., and F. E. Ross. Production of Rubber in Peru, 646*
- Romeu, M. A. de. Deux Voyages dans l'Amérique du Nord, 554*; Voyage au Congo, 314*
- Roosevelt, T. African Game Trails, *rev.*, 205
- Rose, J. N. Studies of Mexican and Central American Plants, 636*
- Rosell, R. G. La ciencia y los temblores, 715*
- Ross, C. E., *joint author*, see C. Romero.
- Ross, F. E. Petroleum Industry in Peru, 555*
- Rosse, I. C., J. Muir *et al.* Cruise of Revenue-Steamer Corwin in Alaska and the N. W. Arctic Ocean in 1881, 720*
- Rossini, C. C. Principali studi pubblicati in occasione della missione Duchesne-Fournet, 67*
- Rotch, A. L., *joint author*, see L. Teisserenc de Bort.
- Rothaug, J. G. Geog. Volksschul-Atlas usw., *n.*, 713; — und H. Trunk. Schulwandkarte des Herzogtums Steiermark, *n.*, 311
- Rothpletz, A. Über die Ursachen des Kalifornischen Erdbebens von 1906, 714*
- Rottmann, H. Murmanische Küste, 719*
- Rouch, J. Expédition Antarctique du Dr. Charcot . . . (1908-1910). Principaux résultats d'océanographie physique, 872*
- Rouen, Les ouvriers du coton dans la région de. J. Levainville, 558*
- Rouillard, E. Région de Mistassin, 152*
- Rousiers, P. de. Les grands Ports de France, leur Rôle économique, *rev.*, 702
- Roux, Dr. J. Îles Arou et Kei, 156*
- Rowan, Mrs. A. Flower-Hunter in Queensland and New Zealand, 319*
- Royal Geographical Society, Suggestions for the Future Work of. Maj. L. Darwin, 779
- Rubber. See also Para Rubber: ¶Kautschukkultur in Mexico. H. J. Ludwig, 67*; Rubber Workers of the Amazon. A. Lange, 33 ¶Map: Kautschuk-Weltkarte 1911, *n.*, 473
- Rudaux, L. La pluie en France en 1910, 638*
- Rudolph, Dr. E. Beziehungen zwischen tektonischen und seismischen Verhältnissen Ostasiens, 70*
- Ruedemann, R. On Symmetric Arrangement in the Elements of Paleozoic Platform of North America, 221*; see also H. P. Cushing, *joint author*.
- Rügen, Map: Grösse und Lage der Wohnplätze von Neu-Vorpommern und Rügen, Volksdichtekarte von —. Dr. E. Müller, 710*
- Rühl, A. Über Grundlagen der Landeskunde von Spanien, 227*
- Rumania: ¶Description de la distribution géographique du pétrole en Roumanie. M. Nicolesco, 871*; Pe-

- troleum Investigations in Hungary and —, 859; Situation économique de la Roumanie, 71*; Studien in den Kalkmassiven des Appennin, 639*
- Rumphius, G. E. Ambonsche Historie, 224*
- Rung, Dr. R. Verbreitung der Bananen-
enkultur (Map), 713*
- Runic Monuments, The old Northern
— of Scandinavia and England, now
first Collected and Deciphered by G.
Stephens, 320*
- Russell, Count H. Pau and the Pyrenees, 320*
- Russell, W. S. C. Jan Mayen Expedition
of 1911, 881; Physiographical
Features of Iceland, 489
- Russia: ¶ Annual of Meteorol. and
Magnetic Observatory of the Imp.
Univ. at Odessa, 1908, 316*; Über
den Einfluss niedriger Bodentemperatur
auf die Vegetation. Prof. G.-J.
Tanfilief, 72*; Empires and Emperors
of Russia, etc. Count Vay de Vaya
and Luskod, 319*; Geological and
Mineralogical Annual of. [In
Russian], 719*; *Liesnoye Dielo* [Forest
problems in the North], 316*;
Projet du Levé magnétique de l'Empire
russe et les travaux magnétiques.
M. Rykatchev, 793*; Projet de transcription
des noms géographiques de l'empire
russe sur la future carte intern.
du monde au millionième. D. Aïtoff,
478*; Recueil des nivellements des
chemins de fer . . . comme base des
travaux hypsométriques. Gen. J.
de Schokalsky, 71*; Russische
Grossschiffahrtswege. Dr. R. Hennig,
871*; Empire and Czarism. V. Bérard,
319*; Russie et la Chine, 637*; —,
Pologne et Finland. Tableau statist.,
géog., etc. . . . monarchie russe prise
isolément. J.-H. Schnitzler, 239*; —
and Turkey in the Nineteenth Century.
E. W. Latimer, 320*; With Russian,
Japanese and Chunchuse. Experiences
of an Englishman during the Russo-Japanese
War. E. Brindle, 320*; Town and
Village in European Russia. Sketch
of Economic Geography. [In Russian.]
B. P. Semenov, 316*; Review of above
in French, 719*; Variations périodiques
des glaciers, 1909, Russie. J. de
Schokalsky, 559*; Russia in Asia.
See under Asia ¶ Maps of Russia:
Distribution of Population and location
of towns in European —. [In Russian.]
B. P. Siemenov, n., 311; Meteor.
Maps accompany "Ausbereitung kalter
Luft in Russland und Nordasien,"
879*; Schiffahrtswege Russlands, 711*;
Six Charts of the Russian Coasts,
Hydrographic Office Pub., 798*
Russian Turkestan. See under Turkestan.
- Russier, H., et H. Brenier. L'Indochine
française, *rev.*, 931
- Ruwenzori, Height of. Capt. E. O.
Henrici, 918
- Rux, W., *joint author*, see F. Jaeger.
- Rykatchev, M. Projet du Levé magnétique
de l'Empire Russe, etc., 793*
- S.
- Saad, Dr. L. Jaffa, 155*
- Saane, R., Map: Trois "boucles" de la
Saraine. Levé à la règle à éclimètre.
C. Calciati, 959*
- Sacco, F. Appennino settentrionale e
centrale, 793*; Schizzo geotettonico
dello Appennino settentrionale e centrale
secondo i rilevamenti di, 311*
- Sachse, Kapn. F. J. P. Schetskaart
van het, Sentani-Meer, Noord Nieuw-
Guinea, n., 957
- Sächsisch-Thüringischer Verein für
Erdkunde zu Halle, *Mitteilungen* des,
227*
- Sacrificios, Island of (Mexico). Z. Nuttall,
222*
- Saderra Masó, Rev. M. Seismic Centers
of Samar, Leyte, and E. Mindanao,
557*
- Saga of King Sverri of Norway.
Translated by J. Sephton, 239*
- Sagonds, Lieut. Casablanca: Monographie
de la Chaouia, 476*
- Sahara: ¶ De l'Adrar à la Baie du
Lévrier. Lieut. Mugnier-Pollet, 556*;
Austrian Expedition to, 55; La Conquête
du Sahara. Essai de psychologie politique.
E. F. Gautier, *rev.*, 695; Depressioni
ad Oriente del Ciad. L'Eguei ed il Toro.
L. Cufino, 69*; La France et la Turquie
dans le Sahara oriental. E. Rouard de
Card, 480*; French Sahara. N. Villate,
526; French Military Reconnaissances
in, 854; Jonction du territoire de Zinder.
Lieut. Detchebarne, 69*; Les Oasis
des Zibans. A. de Claparède, 315*;
Oberflächengestaltung und Hydrographie
des saharisch-sudanischen abflusslosen
Gebietes. H. Marquardsen, 556*;
La question du Tibesti. R. de Caix,
717*; Sahara algérien. E. F. Gautier,
rev., 140; Le Sahara Soudanais.
M. Zimmermann, 717*; A travers le
Sahara. N. Villatte, 637*
¶ Maps of Sahara: Croquis schématique
des régions de l'Ouest du cercle
Colomb. Lieut. Bernard, 78*; D'In-

- salah au Niger par l'Ahaggar, 391*;
 Itinéraire du Capitaine Cortier dans l'Adrar, 79*;
 Reconnaissance des Compagnies sahariennes du Touat et de la Saoura dans les Ergs Atimine, etc., 377*;
 Sahara Oriental, 955*
 Saïd, Port. See Port Saïd.
 Sailing Vessels: ¶ Clipper Ship Era. Epitome of Famous American and British Clipper Ships . . . 1843-1869. A. H. Clark, *rev.*, 542
 St. Andrew Sound, Ga., Chart U. S. Coast and Geod. Surv., 545*
 Saint Anthony Falls, Hennepin at the. N. H. Winchell, 714*
 Saint-Dié's Celebration of printing of Waldseemüller's *Cosmographiae Introductio*, 290
 St. George R. and Muscle Ridge Channel, Maine, Chart U. S. Coast and Geod. Surv., 309*
 St. Helena, Progress of, 316*
 Saint John Lake, Map: La Vallée du Lac Saint-Jean, 634*
 St. John R., Fla., from Jacksonville to Hibernia, Chart U. S. Coast and Geod. Surv., 545
 St. Lawrence R. Basin, 1909. C. C. Covert, A. H. Horton and R. H. Bolster, 635*
 St. Louis and Vicinity, Studies in Glacial Geology in. J. A. Drushel, 867*
 St. Louis Quadrangle, Geology and Mineral Resources of. N. M. Fenneman, 788*
 Saint-Martin, V. de et Fr. Schrader. Atlas Univ. de Géog., Indo-Chine, *n.*, 552; Mongolie; Maroc; Égypte et Soudan Égyptien, 312
 Saint-Palais-sur-Mer, Monographie de la commune de. D. Morin, 871*
 Saint-Pierre et Miquelon, Statistiques du Commerce . . . 1908, 789*
 St. Romuald d'Etchemin, Pairie de. L'abbé B. Demers, *n.*, 924
 Saint-Véran, Le village de. R. Blanchard, 315*
 Sakolski, A. M. Economic Phases of Railroad Rate Controversy, 317*
 Salesses, E. Guinée Française: Chemin de fer et Progrès, 154*
 Salinas, Fr. F. C. Distrito de Luanhuaná, Provincia de Cañete, 715*
 Salisbury, R. D. Elementary Physiography, *rev.*, 386; Physiography in the High School, 399*
 Salomon, W. Adamellogruppe, ein alpinen Zentralmassiv, und seine Bedeutung für Gebirgsbildung, etc., 478*
 Saltoro Pass. T. G. Longstaff, 792*
 Salt Plain: Nel piano del Sale. [In Abyssinia.] A. M. Tancredi, 639*;
 Aridity, Salt Deposits and Currency, 692
 Salt Range, Lakes of the — in the Punjab. T. H. D. LaTouche, 225*
 Salvador: Balsam of Peru. A. Hale, 790* ¶ Map: Balsam Coast of, 546*
 Samar, Charts U. S. Coast and Geod. Surv.: Guian Harbor, South Coast of Samar, 875*;
 — and Leute. Calbayog to Tacloban, 309*;
 Southern Part of, 158*
 Samné, Dr. G., and Y. M. Goblet. Vie politique Orientale en 1900, *n.*, 934
 Samoa: ¶ Handel der afrikanischen Kolonien und Samoas, [German], 1909, 68*;
 Der Handel Samoas. R. Deeken, 226*;
 Pflanzungsbetriebe auf, 558*;
 Trois Archipels de la Polynésie orientale. Samoa, Îles sous le Vent; Marquises. R. La Bruyère, 638*
 Sánchez, Z., and T. Loos. Demarcación de Limites con Chile (Map), 955*
 Sand Dunes: ¶ Les dunes continentales de Moret-sur-Loing, front oriental de la forêt de Fontainebleau. C. Duffart et F. Bergeron, 718*;
 Fixation of the Dunes on the Coast of Jutland. W. J. Morrill, 718*;
 Genesis and Development of Sand Formations on Marine Coasts. P. Olsson-Seffer, 953*;
 Hollandsche Duinen, Grontwater en Bodemdaling. E. Dubois, 719*;
 Über Stranddünen und ihre Befestigung. W. Stavenhagen, 872*;
 Studien über nordostdeutsche Inlanddünen. Dr. F. Solger, *n.*, 144
 Sandström, J. W. On the Relation between Atmospheric Pressure and Wind, 872*
 Sanford, C. M. Wisconsin Lead and Zinc District, 474*
 Sanford, Le Général. Reconnaissance de l'Association du Congo. A. J. Wauters, 791*
 Sanford, S. Saline Artesian Waters of the Atlantic Coastal Plain, 553*
 San Francisco, Topographic Environment of. R. S. Holway, 789* ¶ Charts U. S. Coast and Geod. Surv.: San Francisco Entrance, 309*;
 Southern part of, 631*
 San José de Costa Rica. Dr. M. S. Soriano, 554*
 San Juan Passage to Port Humacao and western part of Vieques Island, Chart U. S. Coast and Geod. Surv., 309*
 San Luis Pass to Matagorda Bay, La., Chart U. S. Coast and Geod. Surv., 631*
 San Pedro del Gallo (Durango),

- Estudio Geologico de la Region de. Dr. C. Burkhardt, 222*
- San Remo-Porto Maurizio, Map, *n.*, 311
- Santa Fé R. R., Geological Work along the. N. H. Darton, 195
- Santarem, O 2° Visconde de — e os seus Atlas Geographicos. J. A. de Freitas, *n.*, 215
- Santa Rosa Island to Point Buchon, Cal., Chart U. S. Coast and Geod. Surv., 631*
- Santee R. Drainage Basin, 222*
- Santi, E. Ascensions nouvelles dans le Dauphiné, 793*
- Santiago, Catálogo del Archivo de la Real Audencia de, 720*
- Santo Domingo: ¶ Dominican Cacao. W. E. Pulliam, 395*; Foreign Commerce of the Dominican Republic in 1910, 636*; Trade, Industries, Railways and Ports of, 395*
- Santolalla. See Malaga Santolalla.
- São Paulo: ¶ Dados climatologicos do Verão de 1908. J. N. B. Mattos, 223*; do Anno de 1909. J. N. B. Mattos, 790*; Economic Climatology of the Coffee District. R. DeC. Ward, 428; L'élevage dans l'État de. L. Misson, 950*; Das Flussgebiet der Ribeira de Iguaçu im Süden des Staates S. Paulo. G. Stutzer, *rev.*, 695; Revista do Museu Paulista. Vol. VIII. H. v. Ihering, 960*; ¶ Map of São Paulo: Three Climatological Maps, *n.*, 547
- São Sebastião e Rio Juquiriqueré, Planta do Littoral de, *n.*, 955
- São Thomé and Principe, Manual Labour in. F. Mantero, *rev.*, 535; Map, 708*
- Sapper, Dr. K. Buka. Nach Aufnahmen von Dr. G. Friederici und Schön sowie Beobachtungen von —, 226*; Map, *n.*, 233; Durchquerung von Bougainville, 226*; Map, *n.*, 233; Geographische Bedeutung der Vulkane, 74*, Höhenschichtenkarte von Neu-Hannover, *n.*, 232; Geol. Kartenskizze von Buka, *n.*, 233; Nachrichten über den Ausbruch des Matavanu auf Savaii, 1909-10, 638*; Übersichtskarte von Neu Mecklenburg u. Nachbargebieten, Übersichtsk. der ungefähren Volksdichte auf, Verbreitung der Vegetationsformationen (map), *n.*, 232; Höhenschichtenkarte u. Geol. Kartenskizze von nord u. Süd Neu Mecklenburg, *n.*, 232
- Sarasin, P. Über Wüstenbildungen in der Chelléen-Interglaciales von Frankreich, 226*
- Sargasso Sea, Sea Weed in. Dr. J. J. Stevenson, 691
- Sargeson, Prof. F. W., Personal, 623
- Sarine: See Saane.
- Saskatchewan, Maps: Alberta and — Map to show Portions explored in 1908-9, 310*; Indexed pocket Map of, accompanied by reference index, 796*; Index to Townships in Saskatchewan, Alberta, etc., 230*, *n.*, 390; Manitoba — and Alberta, Cereal Maps of, *n.*, 159; Sketch Map showing topography of 3rd Mer. from Township 52 to 60 and of 16th Base Line; the 15th Base Line between 3rd and 4th Mer., 390*
- Saskatchewan R. District. W. McInnes, 949*
- Saunders, Prof. E. J. Climate of Puget Sound Basin, 619
- Savaii: ¶ Ascent of Matavanu in. T. Anderson, 225*; Besuch des Vulkans auf der Samoa-Insel —. Oberleut. Schnoeckel, 792*; Der jüngste Vulkanausbruch auf. A. Klautzsch, 558*; Nachrichten über den Ausbruch des Matavanu 1909-10. Prof. Dr. K. Sapper, 638*
- Savannah River Drainage Basin, 394*
- Savannah to Sapelo Island, Chart U. S. Coast and Geod. Surv., 158*
- Savoy, Relation of a Journey to the Glaciers in the Dutchy of. T. Bourrit (1776), 238*
- Saxony, Province: ¶ Zur Genesis der Braunkohlenlager der südlichen Provinz Sachsen. H. Potonié, 558* ¶ Maps: Strassen-Karte der Provinz Sachsen, *n.*, 234; Verbreitung der Salzflora in Anhalt, Provinz-Sachsen usw., 958*
- Scandinavia, Upper Limits of Forest Trees in, 689
- Schaeffer, Mrs. C. Lecture on "At the the Sources of the Athabaska and Saskatchewan Rivers," 195
- Schäfer, R. Hochtouren in den Alpen, Spanien, Nordafrika, Kalifornien und Mexico, 320*
- Schanz, M. Wirtschaftliche Verhältnisse in Ägypten und dem — Sudan, 950*
- Schardt, Prof. H. Dérivations glaciaires de cours d'eau dans la Suisse occidentale et le Jura français, 71*
- Scharff, R. F. On Evidences of a Former Land-Bridge between Northern Europe and America, 228*
- Scheibbs, Bergstürze des Mai 1910 in der Umgebung von. Dr. G. Götzinger, 71*
- Scheil, P. Conférence . . . sur les fouilles et l'histoire de la Babylonie, Assyrie et de l'Elam, 791*
- Scheldt: Zur Geschichte und Natur der Schelde-Mündungen in der Nieder-

- länd. Provinz Zeeland. F. Müller, 952*; *Het Scheldediluvium*. Dr. J. Loricé, 639*
- Schenk, Dr. A. *Étude sur l'anthropologie de la Suisse*, 478*; *Obituary*, 204
- Scheu, Dr. E. Vorläufiger Bericht über eine Studienreise nach der Insel Corsica, 397*
- Schiaparelli, C. *Ibn G'unayr. Viaggio in Ispagna, Sicilia, Siria, Palestina, Mesopotamia, etc. Prima traduzione . . . Arabo da —, rev.*, 216
- Schiebel, W., *joint author*, see E. C. Abendanon.
- Schiffer, Capt. *Mission industrielle et commerciale en Afrique Occidentale Française*, 154*
- Schilling, Prof. Dr. Viehzucht in den deutschen Kolonien, 227*
- Schlagintweit, Dr. O. Eine Bergfahrt im nördlichen Peru, 715*
- Schleswig-Holstein, Map: Die Muttersprache der Bevölkerung in den einzelnen Kreisen der Provinz Schleswig-Holstein, 878*
- Schlobach, Maj. A. D. Mit Lindequist durch Ostafrika, 68*
- Schlütter, Dr. O. Beiträge zur Bevölkerung- und Siedlungsgeographie Deutschlands, 227*
- Schmidt, Dr. E. Aus dem italienischen Marken, 398*
- Schmidt, Dr. M. G. Deutsche Kolonialschule in Witzenhausen, 952*; see also A. Steinhauß, *joint author*.
- Schmidt, P. W. Grundlinien einer Vergleichung der Religionen und Mythologien der austronesischen Völker, 72*; Die Stellung der Pygmäenvölker in der Entwicklungsgeschichte des Menschen, 479*
- Schmied, A., and Arnold. *Carte de la région des marais du Rio Pilcomayo et du Rio Confuso*, 67*
- Schmitthenner, H. *Lop-Nor-Problem und seine Lösung*, 156*
- Schnitzler, J.-H. *Russie, Pologne et Finlande. Tableau statistique, etc.*, 239*
- Schnoekel, Oberleut. Besuch des Vulkans auf der Samoa-Insel Sawaii, 792*
- Schoen, Prof. —. *Alte Sitten in der Bretagne*, 315*
- Schofield, S. J. *Reconnaissance in East Kootenay*, 949*
- Schokalsky, Gen. J. de. *Recueil des nivellements des chemins de fer de la Russie comme base des travaux hypsométriques*, 71*; *De l'utilité d'une association cartographique internationale*, 73*; *Variations périodiques des glaciers*, 1909. *Russie*, 559*
- Scholefield, G. H. *Origins of the New Zealand Nation*, 718*
- Schomburgk, H. *Wild und Wilde im Herzen Afrikas*, n., 926
- Schönebeck, A. *Kiachta*, 224*
- Schonken, F. T. *Wurzeln der Kapholändischen Volksüberlieferungen*, 72*
- School Geography. See under Geography.
- Schott, Dr. G. Bedeutung einer internationalen Erforschung des Atlantischen Ozeans in physikalischer und biologischer Hinsicht, 74*; Neuere ozeanographische Arbeiten der Deutschen Marine, usw., 74*; *Physische Meereskunde*, n., 387
- Schrader, Fr., *joint author*, see V. de Saint-Martin.
- Schrader, Dr. O. *Indogermanen*, *rev.*, 943
- Schuler. *Élevage de l'autruche à Madagascar*, 155*
- Schultz, A. R. *Southern Part of Rock Springs Coal Field, Wyo.*, 151*; *Weathering of Coal in Arid Region of Green River Basin, Wyo.*, 151*
- Schultze, Dr. E. Streifzüge durch das nordamerikanische Wirtschaftsleben, *rev.*, 531
- Schultze, R. *Karte des besiedelten Gebietes der Landschaft Turu*, n., 797
- Schulze, Dr. F. *Polarforschung im geographischen Unterricht*, 228*
- Schulze, L. F. M. *Führer auf Java*, 400*
- Schumacher, Dr. G. *Karte des Ostjordanlandes*, 709*
- Schuster, Dr. A. N. *Eine Reise über die Anden*, 868*
- Schütze, H. *Zur Verbreitung und Entstehung der Posener Seen*, 639*
- Schuykill R., *Philadelphia Water Front, Chart U. S. Coast and Geod. Surv.*, 631*
- Schwender, J. *Der Steigerwald: ein Beitrag zur Geographie Frankens*, 679
- Science Bulletin*, Kansas Univ., 152*
- Science Teaching, Broad Lines in*. Edited by F. Hodson, *rev.*, 464
- Scotland: *¶ Bathymetrical Survey of Scottish Freshwater Lochs, conducted under direction of Sir John Murray and L. Pullar. Report on Scientific Results*, 320*; *rev.*, 933; *Caledonia; or, Historical and Topographical Account of North Britain from most ancient to the present Time, etc.* G. Chalmers, 320*; *Celtic Scotland: History of Ancient Alban*. W. F. Skene,

- 320* **Q** Map of Scotland: Density of Population of, 879*
- Scott, Capt. R. F., sails for the Antarctic, 57
- Seals: **Q** Fur Seals of Bering Sea, 286; — and Fur-Seal Islands of the North Pacific Ocean. D. S. Jordan *et al.*, 239*; Illustrations showing Condition of — Rookeries in 1895 and Method of Killing Seals. C. H. Townsend, 240*; Fur Seal Treaty signed at Washington, 622
- Seaman, L. L. Wonders of Mosi-Oa-Tunga: The Falls of the Zambesi, 951*
- Sea Power, Influence of — upon History. 1660-1783. A. T. Mahan, 239*
- Sechuan: **Q** Mongolia-Se-chuan Exp. of the Imp. Russian Geog. Soc. P. K. Kozlov, 396*; Reise durch die Eingeborenstaaten in Westszechuan. Weiss, 224*; Spedizione nella Mongolia e nel Seciuau. P. Kozlov, 951*
- Q** Map of Se-chuan and Tibet: Itinéraire au Tibet oriental. J. Bacot, *n.*, 550
- Sederholm, Dr. J. J. Sur la géomorphologie de la Finlande, 71*
- Seelheim, Dr. H. Filchner'sche Vorexpedition nach Spitzbergen, 479*; Geol.-morphol. Übersichtskarte der Ueckermünder Heide, 710*; Spitzbergen-Vorexpedition der Filchner'schen Deutschen Antarktischen Expedition, 228*
- Seffer, Dr. P. O. Agricultural Possibilities in Tropical Mexico, 395*
- Seiches in some Lakes of Japan. S. Nakamura and K. Honda, 717*
- Seidlitz, W. von. Lappland. Erinnerungen an den intern. Geologenkongress, 793*
- Seine: **Q** Fenomeni idrologici e climatologici nel bacino della Senna. Dr. G. Pullé, 559*; Sur la crue de la — Janvier 1910. L. Gallois, 718*
- Seiner, F. Verbindungsweg zwischen Deutsch-Südwestafrika und der Betschuanenland Eisenbahn, 154*
- Seismology. See also Earthquakes: **Q** Association Internationale de Sismologie. Dr. F. A. Forel, 73*; Seismische Verhalten des Atlantischen und Pazifischen Ozeans. Dr. G. Gerland, 73*; Seismograph. O. Klotz, 399* **Q** Map: Seismische Karte von Schweden. . . 1910. Dr. R. Kjellén, 80*
- Seligmann, C. G., and B. Z. The Veddas, *rev.*, 930; Map, 956*
- Selkirk Range adjacent to Mount Sir Sandford, Map Part of. H. Palmer, 230*
- Selrain, Gletscherbeobachtungen in — und nördlichen Stubai 1909. Dr. M. Lagally, 477*
- Semenov, B. P. Town and Village in European Russia. Sketch of Economic Geography [In Russian], 316*; Review in French, 719, Map, 311
- Semon, R. In the Australian Bush and on the Coast of Coral Sea, etc., 237*
- Semple, E. C. Influences of Geographic Environment on the Basis of Ratzel's System of Anthropogeography, *rev.*, 937
- Senegal: **Q** Confréries musulmanes et le Maraboutisme dans les pays de Sénégal et du Niger. M. Delafosse, 716*; Statistiques du Commerce . . . 1908, 556*; Travaux de délimitation de frontière anglo-française au nord et au sud de la Gambie. A. B. B. Tscharner, 69*
- Seoul, Cook's Handbook for Tourists to . . . and Seoul, *n.*, 376
- Sephton, J. (*Translator*). The Saga of King Sverri of Norway, 239*
- Servia: **Q** Émancipation économique de la Serbie. G. Gravier, 952*; A travers la Serbie. P. Labbé, 793*
- Sevilla, R. V. y. Republica Oriental del Uruguay en 1910, 790*
- Seward Peninsula: **Q** Geology and Mineral Resources of Solomon and Casadepaga Quadr. P. S. Smith, 474*; Geol. Reconnaissance in S. E. — and Norton Bay-Nulato Region. P. S. Smith and H. M. Eakin, 867*; Mining in. F. F. Henshaw, 474*
- Q** Maps of Seward Peninsula: Geol. Map of Southeastern, *n.*, 630; Reconnaissance Map of Southwestern —, 629*
- Shackleton, Sir Ernest. His Contribution to Biogeography. C. H. T. Townsend, 479*; Proposed Expedition to Wilkes Land, 58; Shackletons Südpolarexpedition und ihre Ergebnisse. O. Baschin, 227*
- Shaler, M. K., *joint author*, see S. H. Ball.
- Shaler, N. S. American Highways, 400*
- Shanghai: Le port de Changhai. Fauvel, 156*
- Shan States: Shans at Home. Mrs. I. Milne, *rev.*, 864
- Shantung, Die Pest in Ost-. P. M. Gäng, 792*
- Shasta Myths. R. B. Dixon, 394*
- Shaw, E. W. Geol. Map of Foxburg

- Quad., Pa., showing Structure and Coal Outcrops, 874*; High Terraces and Abandoned Valleys in Western Pennsylvania, 714*; How to increase the Yield of Wheat in California, 714*
- Sherman, S. A. Lumber Rafting on Wisconsin R., 714*
- Shiites: The Glory of the Shia World. Transl. and Edited from Persian MM. by Maj. P. M. Sykes, *rev.*, 784
- Shilka, Steamship Service on Amur and — Rivers, 621
- Shimer, H. W. Lake Minnewanka Section, 949*
- Shirase, Lieut., leader of the Japanese Antarctic Expedition, 291
- Siam: ¶ Chemins de fer du, 792*; Chemin de fer de Bangkok à la Malaisie Britannique, 156*; Reilsbau in. Dr. C. C. Hosseus, 870*; A travers le. E. de La Jonquière, 477*; True Description of the Mighty Kingdoms of Japan and —. Written Originally in Dutch by F. Caron and Joost Schorten, etc. (1671). R. Manley, 237*
- Siberia: ¶ Zur Geschichte der Bekanntschaft mit Sibirien vor Jermak. H. Michow, 224*; *Niekotoryie danniya k dolednikovoi flory sieviera Sibiri* [Data on the preglacial Flora of northern —]. V. N. Sukachev, 792*; Le progrès du Transsibérien. P. Labbé, 224*; Siberia as It Is. H. De Windt, 236*; Overland Route from Peking to Petersburg. A. Michie, 237*; Record of Travel, Climbing and Exploration. S. Turner, *n.*, 930; Strange — Along the Trans-Siberian R.R. M. L. Taft, *n.*, 698; Tent Life in. G. Kennan, *n.*, 209; Travels in Kamtchatka and Siberia with Narrative of a Residence in China. P. Dobel, 236*; *Ziemledielcheskaia Sibir* [Statistics of Agric. population], 557* ¶ Maps of Siberia: Charts of the Chief Hydrographic Office, 2 Charts showing Siberian Coasts, 799*; Fundorte von Mammut-und Nashorn-Resten in Sibirien, *n.*, 70
- Sibriakoff, A. Über die Fahrten der Novgoroder durchs karische Meer und . . . Halbinsel Jalmal zum Ob, 70*
- Sicily and Southern Italy, Lecture on. Prof. A. S. Riggs, 283
- Sieberg, A. Erdbebenätigkeit in Deutsch-Neuguinea, 226*
- Siebert, Dr. L., to explore Libyan Waste in an Airship, 288
- Sierra Leone: ¶ Bibliography of. *n.* H. C. Lukach, 781; Palm Kernel and Oil Industry, 69*; — and Its Commercial Expansion. T. J. Alldridge, 717*; Sierra Leone [from Trade Report for 1909], 69* ¶ Map of Sierra Leone, 877*
- Sierra Nevada, Geomorphogeny of — Northeast of Lake Tahoe. J. A. Reid, 553*
- Sievers, Dr. W. Source of the Amazon, 197
- Sikkim, Notes on Certain Glaciers in. T. H. D. LaTouche, 225*
- Silva Nuño de, Summary of confession . . . 1597. Summary of the Voyage of the *Corsair*. Report on Part of Sir Francis Drake's Famous Voyage by his prisoner — to the Tribunal of Inquisition of Mexico. Transl. by Z. Nuttall, 873*
- Simcoe District, Ont. W. A. Johnston, 949*
- Similkameen and Tulameen Districts, B. C., Parts of. C. Camsell, 948*
- Simler (Josias). De Helvetiorum Republica, etc., 1577, 239*
- Simon, W. Gran-Chako und die Pam-pas, 67*
- Simons, F. A. A. Peninsula de la Guagira (Map), 955*
- Simplon, Lettres sur la Route de Genève à Milan par le — écrites en 1809. 10^{me} éd. G. Mallet, 218*; Simplon et l'Italie Septentrionale. Promenades et Pèlerinages. J.-L. Belin, 237*
- Simplon, Le Tunnel du. Ed. Barneaud, 316*
- Sinai: Sites délaissés d'Orient: du Sinai à Jerusalem. Comte J. de Ker-gorlay, 225*
- Sion, J. Le Var supérieur. Étude de Géographie physique, *rev.*, 464
- Siriono-Indianer in Ostbolivien. E. v. Nordenskiöld, 395*
- Sitka, Alaska, Results of Observations made at Coast and Geod. Surv. Observatory at —, 1907-8. D. L. Hazard, 867*
- Siuslaw R., Chart U. S. Coast and Geod. Surv., 158*
- Siwa: ¶ Siwah. Oasé des Sonnengottes in der libyschen Wüste. J. C. E. Falls, *rev.*, 628
- Skeena R. District. W. W. Leach, 949*
- Skene, W. F. Celtic Scotland: History of Ancient Alban, 320*
- Skottsberg, C. Einige Beobachtungen über die Eingeborenen Westpatagoniens, 153*
- Sladen, D. Carthage and Tunis, old and new gates of the Orient, 319*

- Sleeping Sickness: ¶Geographische Verbreitung der Schlafkrankheit. Dr. G. Meyer, 318*; *Maladie du Sommeil*. Dr. G. Dreypondt, 228*; *Rapport sur le fonctionnement du laboratoire de Brazzaville depuis 1906*. Heckenroth, 791*; *Sleeping Sickness*, 136; — In Uganda. P. Mac Queen, 181
- Slocan District, B. C. O. E. Leroy, 949*
- Slosse, E. Du Lualaba au Moero, 950*
- Smith, A. L. A Nation in the Making [Union of South Africa], 791*
- Smith, C. D. Fort Peck Indian Reservation Lignite Field, Mont., 221*; Washburn and Fort Berthold Lignite Fields, N. D., 222*
- Smith, H. I., to Conduct Archæological Survey of Canada, 861
- Smith, J. R. Economic Importance of the Plateaus in Tropic America, 36
- Smith, L. L. An Australian Meteorite, 156*
- Smith, P. S. Geology and Mineral Resources of Solomon and Casadepaga Quadr., Seward Peninsula, 474*; — and H. M. Eakin. Geologic Reconnaissance in S. E. Seward Peninsula and Norton Bay-Nulato Region, 867*; Mineral Resources of Nulato-Council Region [Alaska], 151*
- Smith, S. P. Easter Island (Rapa-Nui) and Rapa (Rapa-Iti) Island, 397*
- Smith, W. D. Essential Features of Geology of Philippine Islands, 557*
- Smyrna: Le port de Smyrne, 70*
- Smyth, C. H., Jr., *joint author*, see H. P. Cushing.
- Snape, H. J. Europe. Blackie's Causal Geographies Regionally Treated, n., 866
- Snellen, M., and H. Exama. Rapport sur l'expédition polaire néerlandaise qui a hiverné dans la mer de Kara en 1882-83, *rev.*, 146
- Snow. See also Nieve Penitente: Allerlei Beobachtungen über Schnee und Zackenfirn (Büsserschnee). F. Jaeger, 479*
- Snow Mountains of New Guinea, Expedition to. H. A. Lorentz, 718*, 952*
- Snowden, R. History of North and South America, 236*
- Society Islands: ¶Trois Archipels de la Polynésie orientale. Samoa; Îles sous le Vent; Marquises. R. La Bruyère, 638*
- Socotra, Map: Geol. Karte von Sokótro, n., 877
- Soil, Fertility of the. A. D. Hall, 72*
- Soissons, Count de. Hungarian Self-Taught. Thimm's System, n., 149
- Sokratova, T. Novaya Ziemla, 479*
- Sölch, Dr. J. Studien über Gebirgspässe mit besonderer Berücksichtigung der Ostalpen, 602
- Soley, Lieut. J. C. Map of the Gulf Stream in the Gulf of Mexico showing Currents as they exist during Different Seasons (reverse Pilot Chart of North Atlantic Ocean), 632*
- Solger, Dr. F. Studien über Nordostdeutsche Inlanddünen, n., 144
- Solomon Islands: ¶Buka. Nach Aufnahmen von Dr. G. Friederici u. Bergingenieur Schön sowie eigenen Beobachtungen von Prof. Dr. K. Sapper, 226*; Durchquerung von Bougainville. K. Sapper, 226*
- Somali Coast, French Protectorate: Statistique du Commerce . . . 1908, 556* ¶Map: Carte de la Côte Française des Somalis et Régions avoisinantes. A. Meunier, n., 797
- Somaliland, Italian: ¶Chemin de fer dans la Somalie italienne. E. de Renty, 716*; Il Basso Giuba italiano e le concessioni agricole nella Goscia. Capt. G. Ferrari, 69*
- Soriano, Dr. M. S. San José de Costa Rica, 554*
- Sorre, M. Groupement des populations dans la Catalogne septentrionale, 639*
- South Africa. See under Africa.
- South America. See under America.
- South Australia. See under Australia.
- South Carolina: ¶Results of Spirit Levelling in . . . 1896-1909. R. B. Marshall, 313* ¶Maps of South Carolina: Anderson Co., 77*; Map to Show Distribution of Granites and Granite Quarries, 76*; Map showing production of cotton in 1909, 229*; Soil Survey map of Conway area, 158*
- South Dakota: ¶Badlands of the Black Hills. C. C. O'Harra, 52; Results of Spirit Levelling, 1896 to 1910. R. B. Marshall, 948* ¶Map of Black Hills region. C. C. O'Harra, n., 77*; Sketch Map of Missouri Coteau and its Moraines. J. E. Todd, 955*
- South Georgia: Grytriken [Whaling Station in], 872*
- South Island, N. Z., Map showing Land Transactions 1909-10, 232*
- South Orkney Islands, Argentine Meteorological Station in. C. L. Chandler, 152*
- South Park, Col., Coal Field. C. W. Washburne, 152*
- South Sea Islands. See also Islands of the Pacific Ocean: ¶Ergebnisse der

- Regenmessungen im Jahre 1909, 557*; Possessions allemandes dans la mer du Sud. L. Nemry, 557*; Rechtsleben der Eingeborenen der deutschen Südseeinseln, usw. Dr. R. Thurnwald, 397*; Savage South Seas. N. H. Hardy and E. W. Elkington, 400*; Through Tropic Seas. F. Burnett, *n.*, 380
- Southworth, T. Settlement of Northern Ontario, 66*
- Sowerby, J. Forest Cantons of Switzerland, 239*
- Sowetow, S. Der Aral-See, 155*
- Spain: ¶ Descripción de las costas y puertos de España de Pedro Teixeira Albernás. A. Blázquez, 227*; Über Grundlagen der Landeskunde von Spanien. A. Rühl, 227*; Population of, 621; The Spaniard at Home. M. F. Nixon-Roulet, *rev.*, 383 ¶ Map of Spain: Goode's Base Map, *n.*, 712
- Spanish Dependencies, Inquisition in the. H. C. Lea, *n.*, 947
- Sparks, E. E. Report of Conference on the Relations of Geography to History, 317*
- Spegazzini, C. Notes . . . Agricultural and Pastoral Flora of Argentina, 314*
- Speight, R. Petrological Notes on Rocks from Kermadec Islands . . . some Geol. Evidence for Existence of Sub-tropical Pacific Continent, 70*
- Speiser, Dr. F. Ethnological Investigations in New Hebrides, 857
- Speleology. See also Caves: Recherches spéléologiques dans le Département du Gard, 1904-9. F. Mazauric, 315*
- Spencer, J. W. L'évolution des chutes du Niagara, 66*; Relationship of Niagara River to Glacial Period, 151*; Relative Work of the Two Falls of Niagara, 714*
- Spethmann, Dr. H. Grundzüge der Oberflächengestaltung Cornwalls, 851; Lübeck. Eine landeskundlicher Grundriss, 315*
- Spezia, Map, *n.*, 311
- Spillimacheen Mts., Canada, Expedition to — Photo-Topographical Surveys. A. O. Wheeler, 863*
- Spinner, H. Évolution de la Flore neuchâteloise, 478*
- Spitzbergen: ¶ Binneneiswanderungen in. H. Wichmann, 398*; British Work in —: Some Historical Notes. R. N. R. Brown, 639*; Découverte de gisements de glace fossile à la Nouvelle-Zemble et au Spitzberg. C. Rabot, 479*; Exkursion des XI. Intern. Geol.-Kongresses nach. Dr. F. Wahnschaffe, 479*; — Excursion of the International Geological Congress, 31; Eisverhältnisse an den Küsten Spitzbergens sowie im Ost- und Westeise 1910. G. Isachsen, 719*; Filchnerische Vorexpedition nach. Dr. H. Seelheim, 479*; Spitzbergen-Vorexpedition der Filchnerischen Deutschen Antarktischen Expedition. Dr. H. Seelheim, 228*; Hydrographische Beobachtungen der schwedischen Expedition nach, 1908. A. C. Reichard, 872*; Norwegian Expeditions, 859; Rittmeister Gunnar Isachsens Norwegische Spitzbergen Expedition, 1909-10, 479*; Ressources économiques. J. Denucé, 398*; Zepelin Study Expedition. Prof. E. v. Drygalski, 198; Zeppelin-Studienfahrt nach Spitzbergen und ins nördliche Eismeer, 1910. Dr. E. v. Drygalski, 398*
- Sprigade, P., und M. Moisel. Deutsch-Südwestafrika (map), 231*; Fortschritte der deutschen Kolonial-Kartographie in den Jahren 1905-10, 316*; Die wichtigsten Nordpolarreisen des XIX und XX Jahrhunderts . . . besonderer Berücksichtigung . . . Erreichung des Pols war (Map), *n.*, 234
- Stabler, H. Some Stream Waters of Western United States, 948*
- Stair, Earl of, Personal, 60
- Standley, P. C. The Type Localities of Plants first described from New Mexico, 394*
- Stanley Pool, Navigation sur le Congo et le —. C. Martin, 716*
- Stappenbeck, Dr. R. Vorkordillere zwischen . . . Mendoza u. Jachal in Argentinien, 950*, Map, 707
- Stars, Place Determination: Theorie der astrographischen Ortsbestimmung. L. de Ball, 72*
- Statesman's Year Book, 1911. Ed. J. S. Keltie, 640*
- Stauffer, C. R. Devonian of South-western Ontario, 949*
- Stavenghagen, W. Über Stranddünen und ihre Befestigung, 872*
- Stead, D. G. Brief Review of the Fisheries of South Wales, 477*
- Stearns, M. R. Bibliography of Scientific Writings of R. E. C. Stearns, 789*
- Stearns, R. E. C., Bibliography of Writings of —. M. R. Stearns, 789*
- Stebinger, E., *joint author*, see M. W. Ball.
- Stefánsson, V., — and Anderson in the Canadian Arctic, 771; More News from, 920
- Steigerwald: Ein Beitrag zur Geographie Frankens. J. Schwender, 679
- Stein, Dr. M. A. Maps from Chinese

- Turkestan and W. Kansu, 450; Maps illustrating his explorations in Central Asia, 392*
- Steiner, B. C. Maryland under Commonwealth, 867*
- Steiner, P. Kamerun als Kolonie und Missionsfeld, *n.*, 697
- Steinhauff, A., und Dr. M. G. Schmidt. Lehrbuch der Erdkunde für höhere Schulen, *n.*, 219
- Steinmann, Prof. Sketch-map of four great "Rock-groups" of the Alps. After —, 798*
- Stephens, G. Old Northern Runic Monuments of Scandinavia and England, now first Collected and Deciphered by — Many Hundreds of Facsimiles, etc., 320*
- Steppes, Les — de l'Ancien Monde. E. Lager, 792*
- Stevenson, Dr. E. L. *Editor*. Atlas of Portolan Charts, 530
- Stevenson, J. J. Coal Basin of Decazeville, France, 793*; Formation of Coal Beds, 640*; Sea Weed in the Sargasso Sea, 691
- Stieler's Atlas of Modern Geography, English Adaptation. B. V. Darbishire, *n.*, 235
- Stigand, I. A. Some Contributions to Physiography and Hydrography of North-East Borneo, 224*
- Stockholm, Geological Congress at, 227*
- Stok, Dr. J. P. van der. Elementare Theorie der Gezeiten; nebst den Gezeitenkonstanten der wichtigsten Orte des Indischen Archipels und anderer Hafenplätze, 953*; Map 798*
- Stoll, H., Voyage de — à travers l'Islande, 793*
- Stone, A. H. Studies in American Race Problem, *rev.*, 298
- Stone, Lieut. R. Skeleton or Plotting Charts, 635*
- Stone, R. W., and C. T. Lupton. Powder River Coal Field, Wyo., 151*
- Storm van's Gravesande [Laurens]. The Rise of British Guiana compiled from his despatches by C. A. Harris and J. A. J. de Villiers, 318*
- Stout, A. B. Prehistoric Earthworks in Wisconsin, 222*
- Stowell, W. H., and D. Wilson. History of the Puritans in England, and the Pilgrim Fathers, 239*
- Strauch, General, *Obituary*, 861
- Strauss' Reiserouten im westlichen Persien (Map), 310*
- Streeter, E. S., *Compiler*. Stranger's Guide, or, the Daguerreotype of Washington, D. C., 560*
- Stromboli. Dr. G. Platania, 71*
- Strub, W. Temperaturverhältnisse von Basel, 227*
- Struck, B. Zur Geologie von Kamerun, 870*; Skizze der Hamitischen Sprachgebiete in Aequatorial-Ostafrika (Map), *n.*, 548
- Strümpell, K. Bericht über eine Bereisung des Ostgrenzgebietes der Residentur Adamaua, 555*; — explores Benue R., 288
- Stuart, M. Geology and Prospects of Oil in Western Prome and Kama, Lower Burma, 556*
- Stubai. ¶Alpeiner Ferner in Stubai 1909. Dr. M. Lagally, 477*; Gletscherbeobachtungen in Selrain und nördlichen —. Dr. M. Lagally, 477*
- Stummer, Dr. E. Karte der Ankogel-Hochalmspitzgruppe, 233*; Niederschlag, Abfluss und Verdunstung im Marchgebiete, 397*; Talstudien im Gebiete des Ankogel und der Hochalmspitze, 477*
- Stuntz, S. C., and E. E. Free. Bibliography of Eolian Geology, 953*
- Stutzer, G. Das Flussgebiet der Ribeira de Iguape im Süden des Staates S. Paulo, *rev.*, 695
- Styria: Styrian, Carnac and Julian Alps. J. Ball, 237* ¶Map: Schulwandkarte des Herzogtums Steiermark. Joh. G. Rothaug und H. Trunk, *n.*, 311
- Sudan: ¶Colonisation au Soudan est-elle possible? P. C. Tappi, 153*; From Hausaland to Egypt through the. H. K. W. Kumm, *rev.*, 535; Oberflächengestaltung und Hydrographie des saharisch-sudanischen abflusslosen Gebietes. H. Marquardsen, 556*
- Anglo-Egyptian Sudan: ¶Anglo-Aegyptischer Sudan. G. K. Rein, 153*; Les Dinkas. Col: Largeau, 790*; Englische Bewässerungsanlagen in Aegypten und im Sudan mit besonderer Berücksichtigung des Assuan-Staudammes, usw. G. R. Rein, 395*; Extending the Railroad, 54; Khont-Hon-Nofer. The Lands of Ethiopia. H. K. W. Kumm, *rev.*, 925; Some Red Sea Ports in. J. W. Crowfoot, 716*; Situation actuelle du Soudan égyptien, 950*; Sudan To-day and To-Morrow. H. L. Bridgman, 716*; Wirtschaftliche Verhältnisse in Ägypten und den ägyptischen Sudan. M. Schanz, 950*
- ¶Map of Anglo-Egyptian Sudan: Égypte et Soudan Égyptien. Atlas Univ. de Géog. V. de Saint-Martin et Fr. Schrader, *n.*, 312
- French Sudan, Maps: Mission Tilho.

- Lac Tchad, Bahr el Ghazal, Bodeli et Borkou, *n.*, 231; Schéma du Massalit et itinéraires de la Compagnie Arnaut, 956*
- Suess, E. The Face of the Earth (Translation), Vol. IV, *rev.*, 540; Synthesis of Paleogeography of North America, 635*; Personal, 861
- Suez Canal, Commercial Movement in 1910, 198
- Suez, Gulf of. Petroleum near the, 527
- Sugar, Story of. G. T. Surface, *rev.*, 148
- Sukachev, V. N. Some Data on pre-glacial Flora of northern Siberia [in Russian], 792*
- Sulu Archipelago, Chart U. S. Coast and Geod. Surv., 545*
- Sulu Island, Map, 472*
- Sumatra: ¶ Absence of Religious Conceptions among the Kubus of. Prof. W. Volz, 686; Gunung Si-Bajak. A. Grubauer, 638*; Nord-Sumatra. Bericht über eine im Auftrage der Humboldt-Stiftung der Königlich Preuss. Akad. der Wiss. zu Berlin . . . 1904-06 ausgeführte Forschungsreise. Prof. Dr. W. Volz. Band 1. Batakländer, *rev.*, 377; Problème de la main-d'œuvre à —, 70* ¶ Maps of Sumatra: Das südliche Sumatra mit dem Wohngebiet der Kubus im zentralen Urwald, 709*; Kaart der Tabaksondernemingen ter Oostkust van. Tevens aangevende de Koffeondernemingen. P. de Vries & Zoon, *n.*, 232; Het Ranau-Meer (Zuid Sumatra), 160*
- Sunda Islands. See also Malay Archipelago: ¶ Bericht über die von Dr. Elbert geführte Sundaexpedition des Frankfurter Vereins für Geog. u. Stat. Dr. B. Hagen, 224*
- Superior, Lake, Canoe Routes from — Westward. L. J. Burpee, 394* ¶ Map: Magnetic Variations over Lake Superior for 1910, 229*
- Superior, Lake Region, Progressive Development in the. L. Martin, 561, 659 ¶ Map to show Distribution of Iron Ores of — in 1909, *n.*, 76
- Supf, K. Deutsch-Koloniale Baumwoll-Unternehmungen, 398*, 871*
- Surface, G. T. Rice in the United States, 500; The Story of Sugar, *rev.*, 148
- Surinam: See Guiana, Dutch.
- Sutlej: Sources principales du Brahmapoutre et du Sutledje. A. H. Savage Lander, 225*
- Sutton, C. W. Irrigation of the Coast of Peru, 715*; Peru To-Day. Geographical Sketch, 636*
- Sutton, J. R. Some Observations of Dew at Kimberley, 55
- Sverri of Norway, The Saga of King —. Translated by J. Sephton, 239*
- Swanton, J. R. Indian Tribes of the Lower Mississippi Valley and Adjacent Coast of the Gulf of Mexico, 633*, Map, 789*; see also C. Thomas, *joint author*.
- Swaziland, Agricultural Conditions in. R. T. Coryndon, 555*; Fruit Culture in. R. A. Davis, 717*
- Sweden: ¶ Some Facts on Forestry Conditions in. M. H. Foerster, 719*; Forest Conservation Law. B. E. Fernow, 719*; Journey through Sweden . . . with particulars . . . History of Denmark, etc. Written in French by a Dutch Officer, translated by W. Radcliffe, 1790, 239*; Recul du pin sylvestre dans les montagnes de Suède. C. Rabot, 719*; Die schwedischen Erdbeben. R. Kjellén, 398*; Svenska-Turist-Föreningens Årsskrift 1911, 952*; Variations périodiques des glaciers, 1909. Suède. Dr. A. Hamberg, 559* ¶ Maps of Sweden: Geol. Map of Pre-Quaternary Systems of. A. E. Törnebohm, 711*; Karte öfver Mellersta Sveriges Landformer. (Geol. Survey.) Sten de Geer, *n.*, 711*; Seismische Karte von Schweden . . . 1910. Dr. R. Kjellén, 80*; Spätglaciale Süd-Schweden. Übersichtskarte mit Osen, Endmoränen und Schrammen. G. de Geer, *n.*, 711
- Switzerland: ¶ Dérivations glaciaires de cours d'eau dans la Suisse occidentale et le Jura français. Prof. H. Schardt, 71*; Einbruch des Lötschbergtunnels unter dem Gasterntal. Dr. J. Früh, 71*; Étude sur l'anthropologie de la Suisse. Dr. A. Schenk, 478*; Forest Cantons of. J. Sowerby, 239*; De Helvetiorum Republica, etc. (Josias) Simler, 1577, 239*; Histoire naturelle des Glaciers de Suisse. (G. S.) Grouner, traduction de l'allemand . . . par M. de Kéralto (1770), 238*; Itinéraire du Mont-Righi et du Lac des 4 Cantons . . . description de Lucerne. [J.] Businger, 238*; Jahrbuch des Schweizer Alpenclub, 1910-11, 880*; Klima der Schweiz. Dr. H. Bach, 316*; Orthographie des noms de lieu de la Suisse Romande. E. Muret, 478*; Picturesque Tour through France, Switzerland, etc., in 1816. [Joseph Mawman], 238*; Population of — 1910, 370; Rôle des conditions

- topographiques dans le développement des villes suisses. P. Girardin, 871*; Schweizer Schul-Kartographie. Dr. R. Hotz-Linder, 871*; Stand der schweizerischen Binnen-Schiffahrtsfrage. Dr. A. Hautle-Hättenschwiler, 478*; Swiss Mountain Climbs. G. D. Abraham, *n.*, 701; Swiss Pictures drawn with Pen and Pencil. S. Manning, 238*; Travels from Berlin, through — to Paris in 1804. A. v. Kotzebue, 238*; Voyage pittoresque en Suisse, etc. J. Cambry, 238*; Voyage pittoresque en Suisse, en Savoie et sur les Alpes. E. Bégin, 237*
 ☐ Maps of Switzerland: Atlas to Ebel's Traveller's Guide through... also Vocabulary in Swiss Dialect, French and English, 239*; Maps accompanying "Coudes de Capture" du pays fribourgeois, 959*; Maps illustrating "Les Cirques de Montagne." M. Koncza, 959*; Têtes de ravins du Rio du Petit Rome et du Lavapesson, 959*; Trois "boucles" de la Sarine. C. Calciati, 959*
 Sykes, E. C. Persia and Its People, *n.*, 544
 Sylvester, A. H., *joint author*, see R. B. Marshall.
 Szent (St.) Anna See. Isohypsenkarte, der Umgebung des, Isobathenkarte des, 957*
 T.
 Taal Volcano, Eruption of. Abridged from paper by W. E. Pratt, 903
 Taché, A. M. Cartes Régionales de la Province de Québec, 633*
 Taff, J. A., and W. J. Reed. Madill Oil Pool, Oklahoma, 151*
 Taflelt, Le. D'après René Caillié, 716*
 Tafrata, Région de — et les tribus qui l'habitent. Lieut. Lefèvre and Nehlil, 69*
 Taft, M. L. Strange Siberia Along the Trans-Siberian Railway, *n.*, 698
 Tahiti: ☐ Eastern Pacific Lands: Tahiti and Marquesas Islands. F. W. Christian, *rev.*, 380; Otahiti. Au Pays de l'éternel Été. H. Lebeau, *rev.*, 379
 Taillis, J. du. Mogador, le dernier Port ouvert du Maroc sur l'Atlantique, 790*
 Talbot, H. W. B. Geol. Observations in the country between Wiluna, Hall's Creek, and Tanami, 477*
 Talbot, P. A. Land of Ekoi, Southern Nigeria, 155*; MacLeod Falls on the Mao Kabi, French Equatorial Africa, 637*; Oban District (Map), 79
 Talman, C. F. Brief List of Meteorological Text-Books and Reference Books, *n.*, 220
 Tamalpais, Ascension de. E. Deschamps, 553*
 Tanana, Yukon — Region, Water Supply, 1909. C. E. Ellsworth, 635*
 Tancredi, A. M. Nel Piano del Sale, 639*; Aridity, Salt Deposits and Currency (a Review of above), 692
 Tanfilief, Prof. G.-J. Über den Einfluss niedriger Bodentemperatur auf die Vegetation in Russland, 72*
 Tanga, Zur Geologie und Hydrologie von Daressalam und —. W. Koert und F. Tornau, *n.*, 927
 Tappi, P. C. Une Colonisation au Soudan est-elle possible?, 153*
 Tarawera Eruption and After. Prof. J. Park, 638*
 Tarr, Prof. R. S. Glacial Advance in Alaska and Earthquakes, 285; Man and His Environment in Germany, 227*; Spitzbergen Excursion of the Intern. Geol. Congress, 31; Theory of Advance of Glaciers in Response to Earthquake shaking, 399*
 Tasmania: ☐ Antiquity of Man in. F. Noetling, 871*; Food of Aborigines. F. Noetling, 871*; Geology of. The Pre-Cambrian. L. K. Ward, 226*; Minerals of. W. F. Petterd, 871*; Speech of Tasmanian Aborigines. H. B. Ritz, 226*
 Tassart, L. C. Exploitation du Pétrole, *rev.*, 147
 Tatáu, Nordwestspitze der Insel — (Map). Dr. K. Sapper, *n.*, 232
 Tatra Mts.: Zur Kenntnis der Seen der Hohen —. Prof. Dr. Halbfass, 477* ☐ Maps: Cirque de Gasiennicow Stawy, de Koscielisko et Sondage du Lac Czerwony Staw. M. Koncza, 958*
 Tavernier, Jean Baptiste. Leben und Reisen . . . Handelsgeographen, usw. R. Troonier, 74*
 Taylor, B. *Editor*. Illustrated Library of Travel, Exploration and Adventure, 240*
 Taylor, E. W. Model Experiments on Suction of Vessels, Reverse of Pilot Chart of the North Atlantic Ocean, 547*
 Taylor, F. B. Bearing of the Tertiary Mountain Belt on the Origin of the Earth's Plan, 228*
 Taylor, G. Australia in its Physiographic and Economic Aspects, *n.*, 539

- Tea: Thé. Les Principaux Centres de Production, 719*
- Technical Appliances: Einfluss der Technik auf Verkehr und Siedlung. R. Tronnier, 952*
- Tehuantepec, Isthmus of — "Bridge of the World's Commerce." H. Olsson-Seffer, 152*; Zur jungtertiären Fauna von. E. Böse and F. Toulou, 314*
- Teillers, J. W. Ethnographica . . . Museum Bataviaasch Genootschap van Kunsten en Wetenschappen to Batavia, 72*
- Teisserenc de Bort, L., et A. L. Rotch. Étude de l'atmosphère marine par sondages aériens Atlantique moyen et région intertropicale, 560*
- Teixeira Albernaz, Pedro. Descripción de las costas y puertos de España de —. A. Blázquez, 227*
- Telegraphy: ¶ Destruction of Telegraph Lines by Giraffes in German East Africa, 289; Transatlantic Wireless Telegraphy. Comm. G. Marconi, 640* ¶ Map showing the World's Telegraphic System, 1911, 959*
- Telephone, History of. H. N. Casson, n., 308; Lightning Strokes and —. K. Langbeck, 920
- Témiscamingue, Colonisation du. L'abbé Iv. Caron, 152*
- Tempang, H. A. Agricultural Labour Conditions in Leeward Islands, 554*
- Temperatures: Zusammenhang zwischen Temperaturverhältnissen der Atmosphäre und dem Druck an Erdoberfläche. Prof. W. Trabert, 74*
- Tennessee: Results of Spirit Leveling . . . 1896-1909: R. B. Marshall, 313* ¶ Maps of Tennessee. Abingdon Quad., 629*; Ellijay Quad., 389*; Pikeville Special Quad., 75*; Map showing production of Cotton in 1909, 229*; Soil Survey, Sumner Co., 77*
- Terminology, Geomorphological: Terminologie der Oberflächenformen. A. Hettner, 640*
- Terre Haute, Ind., Physiographic Survey of an Area near. C. R. Dryer and M. K. Davis, 313*
- Terrestrial Magnetism: See Magnetism.
- Terrier, A. Chemin de fer de Konakry au Niger, 154*; Essor de l'Afrique Occidentale Française, 716*
- Tertiary Mountain Belt, Bearing of — on the Origin of Earth's Plan. F. B. Taylor, 228*
- Tetuan: La situation économique de Tétouan. Ch. René-Leclerc, 716*
- ¶ Map: Zone de 10 Kilomètres autour de Tétouan, 472*
- Texas: ¶ Beginnings of — 1684-1718. R. C. Clark, 474*; Great Arc of Primary Triangulation. W. Bowie, 447; Mineral Resources of Llano-Burnet Region, with an Account of Pre-Cambrian Geology. S. Paige, 948*; Tin Deposits of El Paso Co. R. Chauvenet, 553* ¶ Maps of Texas: Burnet and Linden Quadrangles, 75*; General Geol. Map showing location of Burnet and Llano Quadrangles, with principal quarries, mines, and prospects, n., 706; Econ. and Geol. Map of Llano Quad., n., 706; Geologic Map of Texas, n., 706; Geol. Map of Central Coastal Plain Region of — showing location of Clay Deposits, 1911, 875*; Map of Clay and Lignite Fields near Lena, 875*; Map showing production of cotton in 1909, 229*; San Marcos Quad., 389*; Soil Survey maps of Grayson Co., 158*; Morris Co., 77*; Titus Co., 229*
- Textiles, Géographie des. P. Clerget, 479*; Spinn- und Webwerkzeuge. M. von Kimakowicz-Winnicki, 72*
- Thackeray, L. People of Egypt, n., 303
- Theall, G. M. Yellow and Dark-Skinned People of Africa South of the Zambesi, *rev.*, 537
- Theiss, S. Map: Les environs du confluent du Danube et de la Tisza, 957*
- Thierry, C. de. An Anomalous Island, 557*
- Thomas, C., and J. R. Swanson. Indian Languages of Mexico and Central America and their Geographical Distribution, 868*; Linguistic Map of Mexico and Central America, 706
- Thompson, David, a Great Geographer. J. B. Tyrrell, 318*
- Thompson, M. S., *joint author*, see A. J. B. Wace.
- Thompson, S. H. Highlanders of the South, *rev.*, 295
- Thonner, F. R. Vom Kongo zum Ubangi, *rev.*, 64; Übersichtskarte, Sprachenkarte und Aufnahmen des Gebietes zwischen Kongo und Ubangi, n., 159
- Thoulet, J. Couleur des Fonds marins, 318*; — et Chevalier. Mesure des densités d'Eaux marines par Floteurs totalement immergés, 318*
- Thousand Islands Region: ¶ Geology of. H. P. Cushing, H. L. Fairchild, R. Ruedemann & C. H. Smyth, Jr., 222*; Place Names in. J. White, 222* ¶ Maps of Thousand Islands Region: Map to show geology of Clayton, Grindstone, Theresa and Alexandria

- Bay Quadrangles, *n.*, 158*; Map to show Hydrography of, *n.*, 158
- Thuringian Forest, Maps: Thüringerwald-Karten: Eisenach-West, Friedrichroda-Waltershausen, Ilmenau, 79*
- Thurnwald, Dr. R. Rechtsleben der Eingeborenen der deutschen Südseeinseln, *usw.*, 397*
- Tian-Shan: ¶ Carbon and Carbonfossilen des nördlichen und zentralen Tian-Schan. Wiss. Ergebnisse Merzbacherschen Exp. P. Gröber, *n.*, 66; Meine letzte Tian-Schan Expedition, 1907-8, Über Verlauf und Ergebnisse meiner neuen Forschungsreise in den. Dr. G. Merzhacher, 397*
- Tibbaud, Ém. Nos missionnaires au Congo, 68*
- Tibesti, La question du. R. de Caix, 717*
- Tibet: ¶ Central Asia and Tibet. S. Hedin, 237*; The Cloud in Tibet. British Action and Its Results. Sir Francis Younghusband, 156*; The Country and Its Inhabitants. F. Grenard, 237*; Dalai-Lama or Tschilama? 70*; Histoire de la Mission du Thibet. A. Launay, *rev.*, 538; A travers le Tibet oriental. J. Bacot, 718* ¶ Map of Tibet: Itinéraire au Tibet oriental par J. Bacot, *n.*, 550
- Tides: ¶ Elementare Theorie der Gezeiten; nebst den Gezeitenkonstanten der wichtigsten Orte des Indischen Archipels und anderer Hafenplätze, Dr. J. P. van der Stok, 953*; Nautical Science . . . Together with a Study of Tides and Tidal Currents. C. S. Poor, *rev.*, 469 ¶ Map: Linien gleicher Gezeitenphase im Ostindischen Archipel. J. P. van der Stok, 708
- Tierra del Fuego, Breve reseña geográfica y estadística de, 950*
- Tietze, Dr. E. Jahresbericht für 1910 [Austria-Hungary], 792*
- Tietze, O. Geologischen Verhältnisse der Umgegend von Breslau, 558*
- Tikal, Preliminary Study of Prehistoric Ruins of. A. M. Tozzer, 949*; Tikal. T. Maler, 949*
- Tilho, Capt. J. Documents scientifiques de la Mission Tilho (1906-09), *n.*, 303; French Mission to Lake Chad, 223*; Résultats scientifiques de la mission. Ch. Lallemand, 223*, Maps, 231*
- Timbuktu. ¶ Tombouctou en 1909. F. Dubois, 396*; Les Touareg de la région de —. Capitaine Aymard, 223* ¶ Map: Tombouctou, 797*
- Timor, Die Insel. Dr. E. Carthaus, 396*
- Tirashochfläche. Dr. Moritz, 396*
- Tirol: Brennerbuch. Naturansichten . . . aus Tirol. H. Noë, 238* ¶ Map: G. Freytag's Automobil- und Radfahrer-Karten. Südtirol und Oberitalien, 79*
- Tisdell, E. F. Guatemalan Railroad Construction, 395*; Lakes of Guatemala, 395*
- Titel, Carte des environs de, 957*
- Tjader, R. The Big Game of Africa, *rev.*, 302
- Tlahuaililo, Hidrología subterránea de la Comarca Lagunera del —, Durango. J. D. Villarello, 67*
- Tobique District. G. A. Young, 949*
- Tocugirò, N. L'Asie Centrale. Note di viaggio . . . giapponese. Transl. by L. Nocentini, *rev.*, 304
- Toda Land, Dawn in. C. F. Ling, *n.*, 305
- Todd, J. E., *joint author*, see J. A. Udden.
- Togo: ¶ Baumwollfrage in, 396*; Beitrag zur Kenntnis des Klimas von Salaga, Togo und der Goldküste. G. A. Krause, 950*; Der Fischfang der Eingeborenen in den Kolonien Westafrikas. Dr. A. Gruvel, 791*; Togo-Dahomey-Grenzvermessungs-Expedition nebst Mitteilungen über. A. von Seefried, 870*
- Toll, R. H. Notes on Honduras, 789*
- Tölz und die Isarlandschaft. J. Jaeger, 315*
- Tonkin. See also Indo-China, French: ¶ Facteurs essentiels de l'acclimatement du bétail européen au. E. Douarache, 315*; From — to India by the Sources of Irawadi. Prince Henri d'Orléans, 237* ¶ Map of Tonkin: Carte physique, *n.*, 956*
- Topography: ¶ Méthode de l'échantillonnage topographique au service de la morphologie. Prof. J. Brunhes, 74*; Rational Study of Topographic Forms: Topologie. Gén. Berthaut, *rev.*, 361; Rôle des conditions topographiques dans le développement des villes suisses. Prof. P. Girardin, 871*
- Topology: Topologie. Étude du Terrain. Gén. Berthaut, *rev.*, 361
- Torii, R. Les aborigènes de Formosa, 717*
- Tornau, F., *joint author*, see W. Koert.
- Törnebohm, A. E. Geol. Map of Pre-Quaternary Systems of Sweden, 711*
- Torrés, Diego de. Relation de l'Orient et Succès des Cherifs, et de l'État des Royaymes de Maroc, Fez et

- Tarydant, etc. *Mise en François* par M. C. D. V. D. D. A. (1636), 480*
- Toscaneli, Paulo dal Pozzo, In *Memoria di* —. G. Uzielli, 559*
- Totemism, An Analytical Study. A. A. Goldenweiser, 398*
- Toula, F., *joint author*, see E. Böse.
- Touraine, *Topographie gallo-romaine de la*. A. Chauvigné, 718*
- Tournefort [Joseph] Pitton de. *Relation d'un Voyage du Levant, fait par ordre du Roi* (1718), 320*
- Tower, Prof. W. S. Some Factors Influencing the Location and Migration of Industries, 639*; *The Story of Oil*, *rev.*, 146; *Personal*, 529
- Townsend, C. H. Illustrations showing Condition of Fur-Seal Rookeries in 1895 and Method of Killing Seals, 240*
- Townsend, C. H. T. Shackleton's Contribution to Biogeography, 479*
- Tozzer, A. M. Preliminary Study of Prehistoric Ruins of Tikal, 949*
- Trabert, Prof. W. *Geschwindigkeit der Erdbebenwellen in verschiedenen Tiefen*, 318*; *Zusammenhang zwischen den Temperaturverhältnissen der Atmosphäre und dem Druck an Erdoberfläche*, 74*
- Trade: See Commerce.
- Trade Wind: See under Winds.
- Trail, J. W. H. *Flora of the British Islands*, 316*
- Transactions of the American Geographical Society, 51, 130, 195, 283, 365
- Transportation. See also Railways, etc.: *Grandi Comunicazioni di Terra e di Mare*. Capt. L. Giannitrapani, *n.*, 946; *Neue Studien über Isochronenkarten*. J. Riedel, 953*; *Einfluss der Technik auf Verkehr und Siedlung*. R. Tronnier, 952*; *Trade Routes, Past and Present—East and West*. R. Kalisch, 399* ¶ *Map: Vie di Comunicazione Mondiale*, 959*
- Transvaal: ¶ *Cotton Cultivation: Prospects in*. T. A. J. Place, 555* ¶ *Maps of Transvaal: Geol. Map of portion of Lower Witwatersrand System on Central Rand*, 956*; *Geol. Survey Sheets. Portions of Waterberg and Rustenburg, Middleburg and Lydenburg, and Marico Dists.*, 231*; *Geol. Survey Sheets. Map of Klip R. Valley*, 231*; *Map of, revised Jan., 1909*, *n.*, 231; *Sketch Map showing approximate positions of Kimberlite occurrences in the Pretoria District*, 956*; *Zeerust. Portions of Marico, Rustenburg, and Lichtenburg Districts*, 159*
- Travellers' Practical Manual of Conversation, in English, French, German and Italian. E. Marlborough & Co., *n.*, 149
- (Treeman, Ja. (?)). *Description of Eastern Coast of the County of Barnstable, from Cape Cod, or Race Point . . . to Cape Malebarre . . . Spots where Seamen may look for shelter*, 560*
- Trees, Forestry and Lumbering, List of Books and References, 952*
- Trenk, Oberleut. *Bushleute der Namib, ihre Rechts- und Familienverhältnisse*, 154*
- Trento al Brennero, Da. G. Cora, 719*
- Treves, Sir Frederick. *Uganda for a Holiday*, *rev.*, 304
- Trinidad Coal Field, Col. G. B. Richardson, 151*
- Trinidad: Survey of British Imperial Petroleum Questions and technical Description of Oil Fields of. J. D. Henry, *rev.*, 148
- Tripoli: ¶ *Commerce tripolitain dans le centre africain*. J. Etiévant, 69*; *Confine occidentale della Tripolitania e le Oasi del Kaur.* L. Cufino, 69*
- Tripoli: ¶ *Map of Tunis-Tripoli Frontier as laid down by Joint Commission of 1910*, 797*
- Tripyramid Mountain, N. H., Petrography of. L. V. Pirsson, 789*
- Trolle, Lieut. *Expédition danoise de Mylius Erichsen à la côte nord-est du Groenland*, 559*
- Tronnier, R. *Einfluss de Technik auf Verkehr und Siedlung*, 952*; *Jean Baptiste Tavernier. Leben und Reisen . . . Handelsgeographen, usw.*, 74*
- Tropical Regions: ¶ *Alcoolisme dans les colonies et les pays tropicaux*. Dr. Kermorgant, 479*; *Colonisation des Régions Tropicales. Exemple de l'Australie*, 397*; *Bericht über die wichtigsten Faktoren der Akklimatisation europäischen Viehes im warmen Ländern*. Prof. Meuleman, 399*; *Zur Düngung der tropischen Kulturpflanzen*. Dr. Fesca, 317*; *Einige Beobachtungen über tropische Schutzkrussten und Wadibildungen*. Dr. H. Burmester, 73*; *Enquête Intern. sur la main-d'œuvre agricole dans les colonies et les pays tropicaux*, 559*; *Facteurs essentiels de l'acclimatement du Bétail européen dans les pays chauds*. Meuleman, 479*; *Gemüsekultur in den Tropen*, 397*; *Niederschlagsregistr. am Kamerungebirge, 1909-10 unter Berücksichtigung der täglichen Regenverteilung in den*

- Tropen. K. Langbeck, 555*; Periodischen Fehler barometrisch bestimmter Höhenunterschiede in inneren Tropenzone. Dr. Hugershoff, 73*; Pflanzenbau in den Tropen und Subtropen. Dr. M. Fesca, *n.*, 937; Ratgeber für die Ausrüstung von Reisenden nach Übersee u. Tropen. Ch. F. Harford, *n.*, 216; Spécialisation des jardins botaniques dans les recherches d'Agriculture tropicale. Dr. G. Capus, 479*
- Tropic Seas, Through. F. Burnett, *n.*, 380
- Trotter, L. J. History of India, from Earliest Times to the Present Day, 319*
- Trueman, J. D. Gunflint District, Ont., 949*
- Trunk, H., *joint author*, see Joh. G. Rothaug.
- Trusler, J. Habitable World Described . . . Including all the new Discoveries, etc., 240*
- Trypanosomiasis*. See Sleeping-Sickness.
- Tschamler, I. Studie zu Dr. V. Pieteschmanns photogrammetrischen Aufnahmen in Mesopotamien, *n.*, 960
- Tscharner, A.B.B. Travaux de délimitation de frontière anglo-française au nord et au sud de Gambie, 69*
- Tsetse Fly Disease. Further Researches on Development of *Trypanosoma gambiense* in *Glossina palpalis*. Col. Sir David Bruce, Capt. A. E. Hamerton, and Others, 794*
- Tucker, E. W. Five months in Labrador and Newfoundland, during the summer of 1838, 480*
- Tunis: ¶ Carthage and —, the old and new gates of the Orient. D. Sladen, 319*; Date Gardens of the Jerid. T. H. Kearney, 556*; Évolution économique et sociale de la Tunisie. C. de Givenchy, 869*; Les intérêts italiens en Tunisie. C. Fidel, 715*; Notes géographiques sur le Sud Tunisien. A. Joly, 69*; Olivier et le palmier en Tunisie. E. Gallois, 69*; Le Sud Tunisien. L. Pervinquier, 314*; Tunisie. G. Demanche, 155* ¶ Maps of Tunis: Carte de Tunisie au 100,000, 707*; État d'avancement des travaux 1909. Tableau d'assemblage des Cartes d'Algérie et de Tunisie, Serv. Géog. de l'Armée, 547*, 707*; Tunis-Tripoli Frontier . . . Joint Commission of 1910, 797*
- Tunis, City: Transformations de Tunis sous le Protectorat français. F. Ricard, 155*
- Tunnels: Einbruch des Lötschberg-tunnels unter dem Gasterntal. Dr. J. Früh, 71*; Lötschberg Tunnel, 528, 689; Le Tunnel du Simplon. Ed. Barneaud, 316*
- Tunzelmann, G. W. de. Treatise on Electrical Theory and the Problem of the Universe, *n.*, 788
- Turin, Maps: Carta Top. dei Dintorni di Torino, *n.*, 393; Pianta di Torino, *n.*, 393
- Turkestan: Prof. Machaček's Explorations in, 856
- Chinese Turkestan, Maps: Dr. Stein's Maps, 450; Map showing portions of — and Kansu: Portions of Kun-lun Range, Portions of W. and C. Nan-Shan, to illustrate Dr. M. A. Stein's Expl., *n.*, 392*
- Russian Turkestan: ¶ Baumwollernte 1910 in Mittelasiien, 717*; Industrie et les mines du Turkestan, 224*; La question kirghize et la colonisation des Steppes. M. J. Castagné, 477*
- Turkey: ¶ Kartographie in der Türkei. A. D. v. Diest, 227*; Physical Environment as a Factor in the Present Condition of. E. Huntington, 719*; Russia and — in the Nineteenth Century, E. W. Latimer, 320*; Le Sultan, l'Islam et les Puissances. Constantinople — La Mècque — Bagdad. V. Bérard, *rev.*, 699 ¶ Maps of Turkey: Empire Ottoman. Carte statistique des Cultes chrétiens. R. Huber, *n.*, 312; Map of Turkey. Kirjali Sheet, *n.*, 711; Turkey in Europe, Eastern and Central, 312*
- Turner, J. K. Barbarous Mexico, *rev.*, 140
- Turner, S. Siberia. Record of Travel, Climbing and Exploration, *n.*, 930
- Tyrrell, J. B. David Thompson, a Great Geographer, 318*; "Rock Glaciers" or Chrystocrenes, 318*
- Tyrrell, J. W. Across Sub-Arctics of Canada. Journey of 3,200 miles by Canoe and Snoeshoe Through the Hudson Bay Region, 319*
- U.
- Udden, J. A., and J. E. Todd. Structural Materials in Illinois, 474*
- Ueckermünde Heide, Geol.-morphol. Übersichtskarte der. H. Seelheim, 710*
- Uganda: ¶ Baumwollerkundung in, 396*; Sleeping Sickness in. P. Mac Queen, 181; Topographical Survey in, 368; Uganda for a Holiday. Sir Frederick Treves, *rev.*, 304
- Uintah Utes, Myths of. J. A. Mason, 221*
- Ule, Dr. W. Glazialer Karree — oder Polygonenboden, 872*

- Ulloa, Don (Antonio) de. *Memoires philosophiques, historiques, physiques, concernant la découverte de l'Amérique*, etc. (1787), 319*
- Umpleby, J. B. *Geology and Ore Deposits of Republic Mining District*, Wash., 222*; Map, 158*
- Union of South Africa: See *British South Africa*.
- United Kingdom. See also *Great Britain, Ireland and Scotland*: ¶ *Characteristics of British Earthquakes: Summary of Twenty-One Years' Work*. C. Davison, 478*; *Development of Inland Waterways*. H. J. Peddie, 72*; *Flora of the British Islands*. J. W. H. Trail, 316*; *Mountain Climbs*. G. D. Abraham, *n.*, 701; *Recent Progress of Geographical Education in Great Britain*. J. S. Keltie, 872*; *Report of the Progress of Ordnance Survey to March, 1910*, 792*; *State-owned Trans-Atlantic Cable*, 60 ¶ *Climatic: British Climatology*, 621; *Fifth Annual Report Meteor. Committee . . . 1910*, 316*; *British Rainfall, 1908 and 1909*. Dr. H. R. Mill, *rev.*, 539; *Mean Annual Rainfall*. Dr. H. R. Mill, *n.*, 551; *Gulf Stream Drift and British Weather*, 478*; *The Present Position of British Climatology*. H. Mellish, 719*; *Results of hourly Balloon Ascents made from Meteor. Dep. of Manchester Univ.*, 1910, M. White, 559* ¶ *Maps of United Kingdom: Goode's Base Map. British Isles, n.*, 712; *Maps accompanying "The Building of British Isles showing distribution of land and sea through geologic history*, 958*; *Map of the Census Returns, 1911*, 959*; *Maps of lands bordering on the English Channel*, 959*; *Map showing position of Climatological Stations, n.*, 80, 958*; *Positions of stations having self-recording instruments, n.*, 80, 958*; *Positions of Meteor. stations observations from which are used in preparation of daily weather report, n.*, 80, 958*
- United States: ¶ *Great Cities in America*. D. F. Wilcox, *rev.*, 299; *Great Plains in their Relation to Human Occupation and Development*. C. W. Hotchkiss, 635*; *Grosbeaks and their Value to Agriculture*. W. L. McAttee, 948*; *Our Greatest Travelers. Birds that Fly from Pole to Pole and shun Darkness . . .* W. W. Cooke, 788*; *Height and Dominance of the Douglas Fir*. T. C. Frye, 221*; *North American Natural Bridges . . . their Origin*. H. F. Cleland, 151*; *Relations of Present Profiles and Geol. Structures in Desert Ranges*. C. R. Keyes, 474*; *Quantitative Study . . . Conspicuous Vegetation of Certain Natural Subdivisions of Coastal Plain observed in Traveling from Georgia to New York in July*. R. M. Harper, 66*; *A Small Hanging Valley*. G. B. Roorbach, 449; *Some Stream Waters of Western — with chapters on Sediment carried by Rio Grande, etc*. H. Stabler, 948*; *Surface Water Supply of the Great Basin, 1909*. E. C. La Rue and F. F. Henshaw, 635*; *United States, 222**; *Variations periodiques des glaciers, XV^e Rapport. 1909. États-Unis. [In English.]* H. F. Reid, 635*; *Western America*. C. Wilkes, 400*; *Winter in the West*. [C. F. Hoffman], 560* ¶ *Conservation and Reclamation Service: Arid Regions of the U. S. and Reclamation Service. Lecture* C. J. Blanchard, 51; *Observation of Future Lumber Supply*. T. B. Walker, 714*; — *of Natural Resources*. J. Douglas, 474*; — C. R. Van Hise, *rev.*, 295; *Drainage Examinations and Surveys in Georgia by U. S. Dep. of Agriculture, Prel. Report*, 880*; *Fight for Conservation*. G. Pinchot, *n.*, 388; *Forest Fires and their prevention, etc.* J. S. Holmes, 960*; *Official Proceedings of the Eighteenth National Irrigation Congress*. A. Hooker, *editor*; *Progress of Game Protection in 1910*. T. S. Palmer and H. Oldys, 948*; *Protecting Our Forests from Fire*. Hon. J. Wilson, 394*; *Reclamation of Arid West*. F. H. Newell, 714* ¶ *Economic and Commercial: Agricultural Production, 475**; *Cotton Industry*. T. M. Young, 319*; *Cotton Production and Statistics of Cottonseed Products: 1910*, 948*; *Supply and Distribution of Cotton for the year ending Aug. 31, 1910*, 222*; *Consumption of Firewood*. A. H. Pierson, 151*; *Dry Farming in Relation to Rainfall and Evaporation*. L. J. Briggs and J. O. Belz, 523; *Fur Trade on the Upper Lakes, 1778-1815*, 314*; *Future Wheat Supply*. Prof. M. A. Carleton, 151*; *Present Forestry Issues*. Hon. C. Guild, Jr., 394*; *Potash Industry*. G. E. Mitchell, 789*; *Rice in the*. G. T. Surface, 500; *Saving our Fish*. D. Wallace, 948*; *State Ownership of Forests*. A. F. Hawes, 553*; *Territorial Trade of the U. S.*, 948*; *Water Powers in the Northwest*. W. E. Herrin, 221*

- ¶Economic Geology: Economic Geology. With special Reference to the U. S. H. Ries, *rev.*, 219; Contributions to —. Metals and nonmetals except Fuels, 394*; Contributions to —, 1908: Mineral Fuels, 222*; Mineral Paints. B. L. Miller, 789*; Miscellaneous Nonmetallic Products. J. S. Diller, C. Butts and Others, 867*; New Source of Power [Lignite]. G. E. Mitchell, 72*; Phosphates. H. S. Gale, R. W. Richards and E. Blackwelder, 221*; Our 'Greatest Plant Food. G. E. Mitchell, 317*; Government Phosphate Lands, 366; Searching for Mineral Fertilizers, 777; Structural Materials. E. F. Burchard, A. H. Purdur and Others, 221* ¶Geographic Nomenclature: Decisions of the U. S. Geographic Board, 66, 394, 475, 715, 289, 867, 948*; Revision of Previous Decisions, 635*, 715* ¶Government Publications, How to Secure —, 222* ¶Government and Other Reports: Annual Report Statistics of Railways for 1909, 394*; Atlantic Deeper Waterways Association. Report of Proceedings, 1909, 635*, and Summary of Papers on the Subject with Statistics of Coastwise Commerce, 635*; Reports of American Bison Society, 222* Report of Chief of the Bureau of Insular Affairs, 1910, 867*; — of Chief of the Weather Bureau, 1909-10, 867*; Report on Progress and Condition of U. S. National Museum for 1910, 789*; River and Harbor Improvements. Report Chief Engineer, 1910, War Dep., 867*; Tenth Annual Report Governor of Porto Rico, 1910, 868*; Reports of Commissioner of Education, and of Commissioner of the Interior, 1910, 868*; Twenty-Fourth Annual Rep. of Interstate Commerce Commission, 554*; For Reports of Different Bureaus for Philippine Islands, see under Philippine Islands ¶Historical: Annual Report of the Historical Association for 1908, 222*; Dutch Republic and American Revolution. F. Elder, 800*; Early Dutch Immigration to the U. S., 917; The Fight for the Northwest, 1860. W. E. Dodd, 948 ¶Indians: Chumash and Costanoan Languages. A. L. Kroeber, 221; Chippewa Music. F. Denmore, 474*; Ethno-Botany of the Gosiute Indians. R. V. Chamberlin, 788*, 867*; Great Mysteries of the Cheyenne. G. B. Grinnell, 553*; Handbook of American Indian Languages, 367; Indian Tribes of the Lower Mississippi Valley and Adjacent Coast of the Gulf of Mexico. J. R. Swanton, 789*; Iroquois Uses of Maize and other Food Plants. A. S. Parker, 714*; Myths and Legends of the Pacific Northwest. K. B. Judson, *rev.*, 373; Myths of Uintah Utes. J. A. Mason, 221*; Old North Trail; or Life, Legends and Religion of Black-foot Indians. W. McClintock, *n.*, 533; Origin of Iroquois Silversmithing. A. C. Parker, 394*; Shasta Myths. R. B. Dixon, 394* ¶Meteorology: Free Air Data Mt. Weather, for April, May and June, 1910. Wm. R. Blair, 394*; Frost Data of the U. S. P. C. Day, 523; Inversion of Temperature Amplitudes and Departures in the U. S. F. H. Bigelow, 221*; Monthly Weather Review for 1910, 553*; New Monthly Cloudiness Charts for, 618; Report of the Chief of U. S. Weather Bureau, 1908-09, 74*; U. S. Weather Bureau Collecting Meteor. Photographs, 692 ¶Minerals and Metals: Appraising our Coal Lands, 133, Coal and Lignite. C. M. Butts, M. R. Campbell and Others, 553*, Our Coal-Mining Industry in 1910, 133, Half a Billion Tons of Coal, 778; Coke Industry. R. Moldenke, 221*; Conservation of Iron. A. S. Cushman, 867*; Production of Iron Ore, Pig Iron and Steel in 1909. E. F. Burchard, 284; Increased Metal Production in 1909. W. Lindgren, 522; Mineral Resources, 776; Mineral Resources of Wyoming and Mining Laws of the State and of the U. S. C. E. Jamison, 880*; Die mineralischen Schätze der Vereinigten Staaten. Dr. F. Machaček, 221*; Mining Industry in 1909 and Alaska Coal and its Utilization. A. H. Brooks, 553*; Rare Metals. F. L. Hess, 789; Sulphur and Pyrite. R. W. Richards and J. H. Bridges, 789*; Types, Modes of Occurrence, and Important Deposits of Asbestos in. J. S. Diller, 867* ¶Population and Race Problems: European Population in the U. S., 474*; Distribution of Population in. A. P. Brigham, 947*; Population of the U. S. H. Gannett, 394*; Thirteenth Census, 52; Geographic Influences in American Slavery. F. V. Emerson, 13, 106, 170; Highlanders of the South. S. H. Thompson, *rev.*, 295; Scandinavian Element in American Population. K. C. Babcock, 394*; Studies in American Race Problem. A. H. Stone, *rev.*, 298 ¶Skeleton or

Plotting Charts. Suggestion Laid before the Hydrographic Office. Lieut. R. Stone, 635* ¶ Surveys: State Geological Surveys, 365; Survey of Northern and Northwestern Lakes, 789*; Survey Methods and Costs for a Large Area. E. Wilson, 222*; U. S. Geological Survey: [Description of its Lines of Work.] R. H. Chapman, 553*, Results of Triangulation and Primary Traverse for 1906, '07 and '08, 222*; U. S. Coast and Geodetic Survey: Directions for Magnetic Measurements. D. L. Hazard, 867*; Results of Observations made at Sitka, 1907-8. D. L. Hazard, 867*; Results of Magnetic Observations, 1909-10. R. L. Faris, 635* ¶ Transportation: American Highways. N. S. Shaler, 400*; Comparison of Trans-Appalachian Railroads. A. E. Parkins, 314*; Earning Power of Railroads, 1909. Compiled by F. W. Mundy, *n.*, 218; General Catalogue of Mariners' Charts and Books, 314*; New Transcontinental R.R., 519; Our Inland Seas. Shipping and Commerce. J. C. Mills, *rev.*, 139; Revenues and Expenses of Steam Roads, 1909-10, 789*; Review of Waterway Problem. R. M. Brown, 573; Railway Stat. for 1910. Compared with Official Rep. of 1909 and Recent Stat. of Foreign Railways, 554*; Railroad Promotion and Capitalization in. F. A. Cleveland and F. W. Powell, *n.*, 218; Telegraph and Cable Systems of Alaska and Philippine Islands and Operations in U. S., 948*; Westward by Rail: The New Route to the East. W. F. Rae, 400* ¶ Colonies: États-Unis et les Philippines. M. Marchand, 948*; Our Islands and their People, as seen with Camera, etc. J. de Olivares (*et al.*), 319* ¶ Maps of the United States: Ergebnisse der Volkszählung in den Vereinigten Staaten . . . 1910. H. Wichmann, *n.*, 309; Goode's Base Maps, *n.*, 712; Map to show Mean Annual Cloudiness, 546*; Twelve Maps to show mean cloudiness for each month, 546*; Map showing Glacial Geology of — and Canada, *n.*, 954; Map of Twenty-two Spanish and American Trails and Routes Affecting California, 1694-1849, 709*; Physical Map of, *rev.*, 799; Wasserstrassen im östlichen Teile der Vereinigten Staaten, 77* ¶ Biological Survey Maps, 546, 795 ¶ Bureau of American Ethnology Maps, 632, 706; Indian Tribes of the

Lower Mississippi and Adjacent Gulf Coast. J. R. Swanson, 633* ¶ Bureau of the Census: Maps: Cotton production in 1909, 229*; Map showing increase per cent. of the population of each State between 1890 and 1900, Map — between 1900 and 1910, 955* ¶ General Land Office map, 795 ¶ Smithsonian Institution Maps, 158; U. S. Coast and Geodetic Survey Charts, 76, 157, 309, 470, 545, 631, 875; Four base maps of: Distribution of Principal Astronomic Stations, Positions and Connections of Telegraphic Longitude Stations from 1846 to 1910; Routes of Geod. Spirit Levelling and Positions of Gravity and Tide Stations to 1910; Positions of Magnetic Stations Occupied to June 1910, Report for 1909-10, 470*; Cape Flattery to Dixon Entrance, 631*; Sketch of General Progress, Report for 1909-10, 470* ¶ U. S. Department of Agriculture Maps, 77, 158, 229, 389 ¶ U. S. Geological Survey Maps: 75, 157, 228, 308, 389, 544, 629, 706, 794, 873, 953; Distribution of Granite Quarries and Granites in Southeastern Atlantic States, 76*; Map showing Appalachian troughs and principal lines along which stratigraphic overlaps are common, 954*; Map showing condition of astronomic location and Primary Control to Jan. 1, 1909, *n.*, 229; Topographic Maps and Geol. Folios to Jan. 1, 1911, *n.*, 308; Top. and Geol. Index Map showing Progress in Surveying and Engraving, *n.*, 308; United States. Revised Edition, 2 Sheets, *n.*, 76; United States. Relief Map. H. Gannett, *n.*, 76 ¶ U. S. Hydrographic Office Charts: For Pilot Charts of the Oceans see Atlantic and Pacific Oceans. ¶ U. S. Lake Survey Office Maps, 229, 875 ¶ U. S. Weather Bureau Charts, 158, 229, 309, 389, 546, 622, 706, 795; Average Date of First Killing Frost in Autumn, *n.*, 546; Average Date of the Last Killing Frost in Spring, *n.*, 546; Earliest Date on which a Killing Frost occurred in Autumn, *n.*, 546; Latest Date on which a Killing Frost has occurred in Spring, *n.*, 546; Average Length of the Crop-Growing Season Days, *n.*, 546; Meteorological Maps, 795* ¶ War Department Maps, 632, 875 Universe: ¶ Cosmos: Sketch of Physical Description of the Universe. A. von Humboldt, 220*; Evolution of Worlds. P. Lowell, *n.*, 388; Recent Researches in the Structure of the Uni-

- verse. Dr. J. C. Kapteyn, 640*; Treatise on Electrical Theory and the Problem of the —. G. W. de Tunzelmann, *n.*, 788; Universe, or, the Wonders of Creation. F. A. Pouchet, 320*
- Ural, Expedition of Kuznezov Brothers to the Polar — in 1909. [In Russian.] O. O. Baklund, 559*
- Urbina, F., *joint author*, see J. Engerand.
- Uruguay: ¶ Uruguay. W. H. Koebel, *rev.*, 695; Republica Oriental del Uruguay en 1910 según los datos consignados por la Cámara Mercantil de productos del país. R. V. y Sevilla, 790*
- Usu-San Eruption and Earthquake and Elevation Phenomena. F. Omori, 951*
- Utah: ¶ Coal Fields . . . N. E. Utah. H. S. Gale, 313*; San Juan Oil Field. H. E. Gregory, 474* ¶ Maps of Utah: Fish Springs Quad., 76*; Frisco Special Map, 389*; Geol. Map of Crawford Mts., 229*; Geol. Map of Phosphate Deposits near Woodruff, 226*; Jensen Quad., 76*; Map of San Juan Oil Field, *n.*, 630; Map showing Extent of Phosphate Reserve, 229*; Maps showing areas investigated and described in Water-Supply Papers, 875*; Reconnaissance Geol. and Top. Map of part of Jensen Quad., 157*; State of Utah, *n.*, 795
- Uxmal, the City of Xius. Ancient Temples and Cities of the New World. S. G. Morley, 635*
- Uzielli, G. In Memoria di Paulo dal Pozzo Toscanelli, 559*
- V.
- Vacca, Prof. G. Valore morale del popolo cinese, 717*
- Vageler, Dr. P. Einfluss der klimatischen Faktoren auf die Vegetation im allgemeinen und speziell auf die Höhe des Pflanzenertrages, 872*
- Valdés, R. M. Geografía del Istmo de Panamá, 640*
- Vallejos, C., *joint author*, see F. Malaga Santolalla.
- Valleys: ¶ Geological Expedition to East African Rift Valleys. E. F. Kirschstein, 856; Les Origine de la vallée de la Charente. Ch. Passerat, 871*; Valley Filling by Intermittent Streams. A. E. Parkins, 719* ¶ Hanging Valleys of the Yosemite. D. W. Johnson, 826, 890; A Small Hanging —. G. B. Roorbach, 449
- Vallot, H. Progrès récents de topographie et géodésie de haute montagne en France, 73*
- Valparaiso Earthquake, Relief Model showing effects of. G. C. Curtis, 525
- Vancouver Island, Triangulation and Spirit Levelling of. R. H. Chapman, 554* ¶ Map of Vancouver Island, *n.*, 955
- Vanden Plas, J. Étude sur les Kuku, 476*
- Van Hise, Dr. C. R. Conservation of Natural Resources in the U. S., *rev.*, 295
- Var Supérieur, Étude de Géographie physique. J. Sion, *rev.*, 464
- Vasconcellos Galvão, S. de. Dicionario chorographico, historico e estatistico de Pernambuco, 223*
- Vassal, Madame G. M. Life in Annam, 717*; Visit to the Philippines, 397*
- Vaudois or Waldenses, Narrative of an Excursion to the Mountains of Piemont . . . and Researches among the. W. S. Gilly, 238*
- Vay De Vaya and Luskod, Count. Empires and Emperors of Russia, China, Korea, and Japan, 319*
- Veatch, A. C. Coal Deposits near Pinedale, Navajo Co., Ariz., 867*; Map of, 630*
- Veddas, The. C. G. and B. Z. Seligmann, *rev.*, 930; map, 956*
- Vegetation: See Plants.
- Veitch, J. H. Traveller's Notes, or, Notes of a Tour through India, Malaysia, Japan . . . 1891-93, 240*
- Vellani, E. Il primo congresso degli Italiani nel Cile, 790*
- Vener Lake, Water Level of —, Its Periods and Regulation. A. Wallén, 478*
- Venezuela: ¶ Commercial —: Analysis of its Export and Import Trade. J. J. Macfarlane, 869*; Ferrocarril de la Guaira a Caracas. J. Flind, 636*; Geologic and Petrographic Notes on the Region about Caicara. T. A. Bendrat, 715*, 790; Vías de Comunicación de la . . . Comisión Científica Explor. del Occidente de. A. Jahn, 950* ¶ Maps of Venezuela: Camino de Maturin á Caño Colorado, 876*; Centros Pecuarios del Estado Monagas, 876*; Croquis de los caminos de recuas entre Santa Lucia, Caucagua y Guatire, 955*; Croquis demostrativo del Estado de los Trabajos del mapa físico y político de, 876*; Estado actual de la Triangulación, 876*; Exploración del Camino del "Alto Cocoyar" á Maturin, 876*, — de los Caminos que unen á Maturin con

- Puerto San Juan, 876*; — del Río Guarapiche entre Maturín y Caño Colorado, 876*
- Venus, Daylight Observations on. J. P. Ault, 767
- Verde Island Passage to Cuyo, P. I., Anchorage. Chart U. S. Coast and Geod. Surv., 631*
- Vermont: ¶ Population, 13th Census, 1910, 948*; Results of Spirit Levelling, 1896-1909. R. B. Marshall, 66*
- Vernyi, Tremblement de terre de. J. Deniker, 637*
- Verrazzano, Giovanni da — and His Discoveries in North America . . . according to . . . Cellere Codex of Rome. Prof. A. Bacchiani. English version by E. H. Hall, 221*
- Vervloet, Lieut. G. Aux Sources du Nil. Dans la région des volcans, du lac Albert-Edouard et du Ruwenzori, 556*
- Vetch, Col. R. H., *editor*. Life of Lieut.-Gen. the Hon. Sir Andrew Clarke, 320*
- Vialar, Baron de. Les Beni-Messaoud, 476*
- Victoria, Antarctic Land of —. From the voyage of "Discovery." M. Zimmermann, 478*
- Victoria, Australia: ¶ Contribution to Physical History of Plenty R. and Anderson's Creek, Warrandyte. J. T. Jutson, 226*; Notes on Geology of the Country about Anglesea. T. S. Hall, 397* ¶ Map: Victoria. 8 Sheets Geologically compiled and colored by R. Everett, *n.*, 311
- Victoria Falls: Viktoriafalle des Sambesi und ihre Umgebung. J. Brunnthaler, 717*
- Vidal de la Blache, P. Interprétation géographique des paysages, 873*; Atlas général Vidal-Lablache, *n.*, 312
- Vienna, Map: Orientierungsplan von Wien, Verkehrsplan der k.k. Reichshaupt u. Residenzstadt, *n.*, 311
- Vignaud, H. Ancienne et nouvelle campagne pour la canonisation de Christophe-Colomb, 74*
- Villarello, J. D. Hidrología subterránea de la Comarca Lagunera del Tlahuaililo, Durango, 67*
- Villatte, N. A travers le Sahara, 637*; Account of his journey, 526
- Villepelet, F. Syndicate de Navigation à Périgueux pour la rivière de l'Isle en 1520, 719*
- Villiers, J. A. J. de. Foundation and Development of British Guiana, 950*; see also, C. A. Harris *joint author*.
- Vincent, H. Bamboo Pulp as the Paper Material of the Future, 719*
- Vinci, Leonardo da. Pianta d'Imola. Facsimile of a MS. Map by, 799*
- Vineyard Sound and Buzzards Bay, Chart U. S. Coast and Geod. Surv., 158*
- Viollet, H. Au pays du chemin de fer de Bagdad, 951*
- Virginia: ¶ Cement Resources of — west of Blue Ridge. R. S. Bassler, 880*; Hydrography of. Geological Series. N. C. Grover and R. H. Bolster, 880*; Mineral Resources. T. L. Watson, 880*; Powell Mountain Coal Field. M. R. Campbell and E. G. Woodruff, 788*; Results of Spirit Levelling, 1896-1909. R. B. Marshall, 66*; Transition in — from Colony to Commonwealth. C. R. Lingley, *n.*, 295 ¶ Maps of Virginia: Abingdon Quad., 629*; Antietam Quad., 75*; Map to Show Distribution of Granites and Granite Quarries, 76*; Sketch Map of Powell Mountain Coal Field, 630*; Charts U. S. Coast and Geod. Surv.: Atlantic Coast from Cape Henry to Cape Lookout, 309*; Hampton Roads, 875*; James River. Hampton Roads to Point of Shoals, 309*
- Vitoria, G. Tierras fiscales de la colonia Caroya (Córdoba), 868*
- Vivaraire, Haute-Loire et le Haut —. M. Boule, *n.*, 947
- Vladivostok, 637*
- Voeikov, A. Climate of Kislovodsk and Comparison with Other Climatological Stations [In Russian], 793*
- Volcanoes and Vulcanology: ¶ Besuch des Vulkans auf der Samoa-Insel Sawaii. Oberleut. Schnoeckel, 792*; Eruption of Etna, 858; Hawaii and its Volcanoes. C. H. Hitchcock, *rev.*, 210; Mechanism of Volcanic Action. H. J. Johnston-Lavis, 479*; Nachrichten über den Ausbruch des Matavanu auf Savaii . . . 1909-10. Prof. Dr. K. Sapper, 638*; Tarawera Eruption and After. Prof. J. Park, 638*; Usu-San Eruption and Earthquake and Elevation Phenomena. F. Omori, 951*; Volcanoes of Kilauea and Mauna Loa, Hawaii. W. T. Brigham, *rev.*, 141 ¶ Geographische Bedeutung der Vulkane. Dr. K. Sapper, 74*; Mécanisme de l'activité volcanique. Prof. H. J. Johnston-Lavis, 73*; Project for International Institute of Vulcanology in Naples. Dr. E. Friedländer, 60; Rôle de l'eau dans les phénomènes éruptifs. A. Ricco, 74* ¶ Maps: Duke of Mecklenburg Ex-

- pedition's field of work; Volcanic District, German East Africa, 956*; Map showing Relation of Recent Vulcanism to Principal Tectonic Lines, *n.*, 472; Map showing Relation of Volcanic and Seismic Phenomena in West Hokkaido, 797*; Map of Usu Volcano, Japan, *n.*, 877; Sketch Map of the Taal Volcano Region, 957*; Map of Esan Volcano, 877*; Top. Map of Northern Flank of Usu-san showing distribution of 45 Craterlets, etc., 797*
- Volga. F. Homburg, 227*
- Volk, E. Archæology of Delaware Valley, 800*
- Volkens, G., *joint author*, see A. Engler.
- Volz, Dr. W. Absence of Religious Conceptions among the Kubus of Sumatra, 686; Ausrüstung und Reisepraxis. Erfahrungen auf Forschungsreisen in Niederländisch-Ost-Indien, 638*; Nord-Sumatra. Bericht... der Humboldt-Stiftung der Königl. Preuss. Akad. d. Wiss. zu Berlin, 1904-06 ausgeführte Forschungsreise. Band. I. Batakländer, *rev.*, 377; Reise durch das Hinterland von Liberia im Winter 1906-7, 476*; Südost-Asien bei Ptolemäus, 315*
- Voyages: ¶ Early Voyages: Collection of Curious Travels and Voyages. J. Ray (1693), 320*; Early Spanish Voyages to the Strait of Magellan. Introduction and Notes by Sir Clements Markham, 800*; L'Epoca delle grandi Scoperte geografiche. C. Errera, *n.*, 787; Über die Fahrten der Novgoroder durchs karische Meer und über den Weg durch die Halbinsel Jalmal zum Ob. A. Sibiriakoff, 70*; Giovanni da Verrazzano and His Discoveries in North America... according... Cellere Codex of Rome. Prof. A. Bacchiani. English Version by E. H. Hall, 221*; Ibn G'ubayr. Viaggio in Ispagna, Sicilia, Siria, Palestina, etc., etc., nel Secolo XII. Prima traduzione... Arabo. C. Schiaparelli, *rev.*, 216; Itinerario Voyage ofte Schipvaert van Jan Huygen van Linschoten naer oost ofte Portugaels Indien 1579-1592. Edited by Dr. Kern, 951*; Journey through Sweden... particulars relating to History of Denmark, etc. Written in French by a Dutch Officer, and Translated by W. Radcliffe, 239*; Jean Baptiste Tavernier. Leben und Reisen... Handelsgeographen des 17. Jahrhunderts. R. Tronnier, 74*; Relation d'un Voyage du Levant, fait par ordre du Roi. [Joseph] Pitton de Tournefort, 320*; Summary of the confession of the pilot... 1579 Summary of the Voyage of the *Corsair*. Report on a Part of Sir Francis Drake's Famous Voyage of Circumnavigation made by his prisoner, the Portuguese, Nuño de Silva to the Tribunal of Inquisition of Mexico. Transl. by Z. Nuttall, 873*; Voyage de l'Ambassade de la Compagnie des Indes Orientales Hollandaises... 1794, etc. André Everard van Braam Houckgeest. Publié en français par M. L. E. Moreau de Saint-Méry, 237*; Voyage d'André Michaux en Syrie et en Perse (1782-85) d'après son journal et sa correspondance. Dr. E. T. Hamy, 870*; Voyage to the Coast of Africa in 1758. J. Lindsay, 400*; Voyages to Various Parts of the World, and Remarks on Different Countries in Europe, Africa, etc. J. Willock, 240* ¶ Library of Travel, Exploration and Adventure, 240*; Steam Voyages on the Seine, the Moselle, the Rhine; with Railroad Visits... Cities of Belgium. M. J. Quin, 239*; Travels from Berlin, through Switzerland to Paris in 1804. A. v. Kotzebue, 238*; Traveler's Notes, or, Notes of a Tour through India, Malaysia, Japan... 1891-93. J. H. Veitch, 240*; Two Hundred and Nine Days; or, The Journal of a Traveller on the Continent. T. J. Hogg, 239*; Voyage autour du Monde. Exécuté pendant les Années 1830-32, sur la Corvette Favorite, Atlas Hydrogr. [Cyrille Pierre Théodore] Laplace, 239*; Wanderings in New South Wales, Batavia, Pedir Coast, Singapore, and China... 1832... 1834. G. Bennett, 239*
- Vries, P. de & Zoon. Kaart der Tabaksondernemingen ter Oostkust van Sumatra. Tevens aangevende de Koffeondernemingen, *n.*, 232
- W.
- Waagen, L. Die unterirridische Entwässerung im Karst, 315*
- Wace, A. J. B., and M. S. Thompson. Distribution of Early Civilization in northern Greece, 871*
- Wachner, H. Das siebenbürgische Erzgebirge, 316
- Wadai: ¶ Les Événements du Ouadai et la Mort du Colonel Moll. R. de Caix, 224*; Kämpfe der Franzosen im Wadailande, 315*; Occupazione dell' Uadai. L. Cufino, 68*; Ouadai

- Aouali, Lieut. Lucien, 556* ¶ Maps of Wadai: Frontière Ouadai-Darfour, 78*; Schéma du Massali et itinéraire de la Compagnie Arnaud, 956*
- Waddell, L. A. Tibetan Invasion of India in 647 A. D. and Its Results, 396*, Chart, 310*
- Wadis: Einige Beobachtungen über tropische Schutzkrusten und Wadibildungen. Dr. H. Burmester, 73*
- Wagner, Dr. H. Die Pflege der Geographie an der Berliner Universität im ersten Jahrhundert ihres Bestehens, 316*; — *et al.* Geographisches Jahrbuch, for 1910, 560*; Award of Cullum Geographical Medal to, 52, 283
- Wagner, P. A. Origin of German South-West African Diamonds, 69*
- Wahnschaffe, Prof. Dr. F. Exkursion des XI. Intern. Geol.-Kongresses nach Spitzbergen, 479*; Grosse erratische Blöcke im norddeutschen Flachlande, *n.*, 215; Oberflächengestaltung des Norddeutschen Flachlandes, *rev.*, 212; — nach Wahnschaffe. Dr. R. Fox, 558*
- Walcott, C. D. Abrupt Appearance of Cambrian Fauna on North American Continent, 151*; A Geologist's Paradise [Canadian Mountains], 868*; Pre-Cambrian Rocks of the Bow River Valley, Alberta, 222*; Personal, 861
- Waldmann, S. Les Esquimaux du Nord du Labrador, 554*
- Waldo, F. L. Popocatepetl, 636*
- Waldeemüller, Martin. Saint-Dié's Celebration of Printing of —'s Cosmographiæ Introductio, 290
- Walker, T. B. Conservation of Future Lumber Supply, 714*
- Wallace, D. Saving our Fish, 948*
- Walle, P. Au Brésil. Du Rio São Francisco à l'Amazone, *n.*, 534; Territoire fédéral l'Acre et la ligne du Madeira au Mamoré, 636*
- Wallén, A. Water Level of Lake Vener, Its Periods and Regulation, 478*
- Walser, Dr. H. Zur Geographie der politischen Grenzen, 318*
- Walter, A. Sugar Industry of Mauritius: Study in correlation, including Scheme of Insurance against Damage by Cyclones, 918
- Walter, E. Unsere Kameruner Eisenbahnen, 314*
- Walther, Prof. J. Origin and Peopling of the Deep Sea, 318*
- Warburg: Geol. Übersichtskarte der Warburger Störungzone, 958*
- Ward, H. J. B. Mysterious Morocco and how to appreciate It, *n.*, 304
- Ward, L. K. Geology of Tasmania. The Pre-Cambrian, 226*
- Ward, R. DeC. Economic Climatology of the Coffee District of São Paulo, 428
- Wasatch Mountains, Utah, New Light on Geology of. E. Blackwelder, 635*
- Washburne, C. W. Canon City Coal Field, Col., 152*; Florence Oil Field, 152*; Gas Prospects in Harney Valley, Ore., 474*; Gas and Oil Prospects near Vale, Ore., and Payette, Idaho, 474*; South Park Coal Field, Col., 152*; see also G. C. Martin, *joint author.*
- Washington, D. C.: Bohn's Handbook of Washington. C. Lanman, 400*; Stranger's Guide, or, the Daguerreotype of Washington, D. C. compiled by E. S. Streeter, 560*
- Washington, State: ¶ Altitudes in the, 522; Geology and Ore Deposits of Republic Mining District. J. B. Umpleby, 222*; Irrigated Lands of. G. M. Allen, 714*; Road Materials. H. Landes, 880* ¶ Maps of Washington: Geol. Map of Blewett District. C. E. Weaver, 796*; Index Map to Atlas Sheets, *n.*, 631; Soil Survey Maps of Eastern part of Puget Sound, 390*; Map of the State, 158*; Geologic Map of Republic District. J. B. Umpleby, 158*; Pullman Quadr., 308*; Mt. Vernon, Quincy, Red Rock and Winchester Quadrangles, 308*; Zillah Quad., 75*; Charts U. S. Coast and Geod. Surv.: Cape Lookout to Gray's Harbor, 76*; Sea Coast and Interior Waters from Gray's Harbor to Semiammoo Bay, 76*, 875*; Gray's Harbor, 76*; Willapa Bay, 309*
- Water: ¶ Arbeit des fließenden Wassers. A. Hettner, 317*; Conservation of —. J. L. Mathews, *rev.*, 306; Experiments on Settlement of Solids in Water. Dr. J. S. Owens, 317*
- Watkins, A. Outline of Nebraska History, 553*
- Watson, T. L. Mineral Resources of Virginia, 880*
- Wauters, A. J. Le Général Sanford. Reconnaissance de l'Association du Congo, 791*; Le Transafricain de Matadi à Dar-Es-Salam, 716*
- Weaver, C. E. Geological Map of Blewett District, Wash., 796*
- Weaving Looms: Spinn- und Webewerkzeuge. M. von Kimakowicz-Winnicki, 72*
- Weber, Prof. Dr. L. Wind und Wetter, *rev.*, 787

- Weddell Quadrant, Meteorology in — during 1909. R. C. Mossman, 72*
- Weeks, J. H. Congo Medicine-Man and His Black and White Magic, 555*
- Wegemann, C. H. Map of Salt Creek Oil Field, Wyo., 706*; Notes on Coals of the Custer National Forest, 222*; Salt Creek Oil Field, Wyo., 948*; see also H. S. Gale, *joint author*.
- Wegener, Dr. G. Yangtsekiang als Weltverkehrsstrasse, 870*
- Weigall, A. E. P. Guide to the Antiquities of Upper Egypt, *n.*, 927
- Weisgerber, Dr. H. Les Blancs d'Afrique, *n.*, 64
- Weiss. Reise durch die Eingeborenenstaaten in Westszechuan, 224*
- Weiss, Lieut. M. Duke of Mecklenburg Expedition's Field of Work (Map), *n.*, 956
- Weissberger, D. J. A. Noticia de una exploración geográfica y arqueológica en el Norte del Asia Menor, 224*
- Weller, Dr. E. August Petermann: Ein Beitrag zur Geschichte der geographischen Entdeckung und der Kartographie im 19. Jahrhundert, *rev.*, 845
- Wellington Harbor, Physiography of. J. M. Bell, 191
- Wells to Cape Ann, Mass., Chart U. S. Coast and Geod. Surv., 158*
- Werbata, J. V. D. Topographische Opneming van het Eiland Curaçao, 152*
- Werth, Dr. E. Über den Begriff Inlands, nebst Bemerkung über die Schneegrenze in den polaren Ländern, 639*
- Wertheimer, F. Japanische Kolonialpolitik, *n.*, 377
- West Indies. See also Autilles, Cuba, Porto Rico, etc.: ¶Buccaners in the West Indies in the XVIIth Century. C. H. Haring, *rev.*, 457; Privateers and Privates of the —. V. Barbour, 636*; Sketches and Recollections of, 400*; Winter in the — and Florida, 400*
- West Pilbara Goldfield, Geology and Ore Deposits of. H. P. Woodward, 638*
- Westphalia: Städte des rheinisch-westfälischen Industriebezirks. Dr. K. Olbricht, 398*
- Weston, S. Notes on an Expedition into the Interior of North-West Australia, 1908-9, 156*
- [Weston, Stephen]. La Scava; or, some Account of Excavation of a Roman Town on the Hill of Châtelet, etc., 239*
- West Virginia, Maps: ¶Antietam Quad., 75*; Clay, Fayetteville, Gassway and Montgomery Quadrangles, 76*; Peytona Quad., 629*; Sketch Map showing oil and gas fields, location of quadrangles and nature of geol. reports published on each, 874*; Spencer Area, 77*; Sutton Special Quad., 308*
- Western Australia. See under Australia.
- Whales: Grytriken [Whaling Station in South Georgia], 872*; Shore Whaling: A World Industry. R. C. Andrews, 872*
- Wheeler, A. O. Expedition to Spillimacheen Mts., Photo-Top. Surveys, 868*
- Whitaker, J. Almanack for . . . 1911, 320*
- Whitbeck, R. H. Geographical Influences in the Development of New York State, 475*; Regional Peculiarities in Place Names, 273
- White, J. Place-Names in the Thousand Islands, 222*
- White, J. A. How to Use Contour Handmaps for Class Teaching, *n.*, 946
- White, M. Results of Hourly Balloon Ascents made from Meteor. Department, Manchester Univ., 1910, 559*
- White Mountains, Bibliography of. A. H. Bent, *n.*, 781
- White Sea: Winds and Ice in the White Sea and Novaya Ziemla in 1910 [in Russian]. I. Anufrief, 559*
- Whitley, Rev. D. G. Ivory Islands in the Arctic Ocean, 398*
- Whitlock, H. P. Calcites of New York, 960*
- Whitlock, Maj. G. F. A. Yola-Cross River Boundary Commission, 396*
- Who's Who, 1911, 320*
- Whymper, Edward, *Obituary*, 861
- Wichmann, H. Binneneiswanderungen in Spitzbergen, 398*; Ergebnisse der Volkszählung in den Vereinigten Staaten von Amerika, 1910, *n.*, 309; Grosstädte des Deutschen Reichs, 398*
- Wickenburg, E. Graf. v. —'s Reisen in Südamerika 1907-10 (Map), *n.*, 78
- Wilcox, D. F. Great Cities in America, *rev.*, 299
- Wilhelm, I. La Durance. Utilisation de ses eaux, etc., 559*
- Wilke, Dr. G. Spiral- Mäander- . . . Gefässmalerei Hellenen und Thraker. Früh und vorgeschichtliche Kultur, usw., *n.*, 216
- Wilkes, C. Western America, 400*

- Wilkes Land, Australian Antarctic Exped. to Explore, 138
- Wilkinson, G. Sketches of Chinese Customs & Manners, in 1811-12, etc., 237*
- Williams, M. Y. Arisaig-Antigonish District, N. S., 949*
- Williams, R.R. Economic Possibilities of Mangrove Swamps of the Philippines, 951*
- Williamson, N., murdered on Assam-Tibet Borderland, 686
- Willock, J. Voyages to Various Parts of the World, and Remarks on Different Countries in Europe, Africa and America, etc., 240*
- Wilson, A. W. G. Department of Mines of Canada, its Organization and its Work, 475*; Geology of Nipigon Basin, Ont., 554*; Report on Traverse through Southern Part of N. W. Territories from Lac Seul to Cat Lake, 554*
- Wilson, D., *joint author*, see W. H. Stowell.
- Wilson, Dr. L. L. W. Climate and Man in Peru, 67*
- Wilson, E. Survey Methods and Costs for a Large Area, 222*
- Wilson, Hon. James. Protecting our Forests from Fire, 394*
- Wilson, M. E. Northwestern Quebec, etc., 949*
- Wilson, W. B. From the Hudson to the Ohio, 720*
- Wilson, W. J. Geologic Reconnaissance along the Transcontinental R.R. in W. Quebec, 949*
- Wilverth, Capt. Pêche et Poisson au Congo Belge, 716*
- Winchell, A. N. Graphite near Dillon, Mont., 867*
- Winchell, N. H. Hennepin at the Falls of St. Anthony, 714*
- Winds: ¶ Föhn Wind at Innsbruck, 621; Movement of Soil Material by the Wind. E. E. Free, 953*; Passatwinde des Atlantischen Ozeans. Dr. Mey, 640*; On Relation between Atmospheric Pressure and Wind. J. W. Sandström, 872*; Die Winde in Deutschland. Dr. K. Knoch, 793*; Wind und Wetter. Prof. Dr. L. Weber, *rev.*, 787
- Winegar, B. Logging Operations in Province of Quebec, 152*
- Winnipeg, From — to the Arctic Ocean. A. D. Cameron, 715*
- Winter, N. O. Argentina and her People of To-day, *rev.*, 625; Brazil and Her People of To-day, *rev.*, 63
- Wireless Telegraphy, Transatlantic. Comm. G. Marconi, 640*
- Wisconsin: ¶ Chattanooga Campaign, With especial reference to Wisconsin's participation therein. M. H. Fitch, 880*; Frost and Temperature Conditions in Cranberry Marshes of. H. J. Cox, 635*; Fur Trade in — 1815-17, 475*; Lead and Zinc District. C. M. Sanford, 474*; Prehistoric Earthworks in. A. B. Stout, 222*; Results of Spirit Levelling in Michigan and — 1897-1909. R. B. Marshall, 789*; — Women in the War between the States. E. A. Hurn, 880* ¶ Maps of Wisconsin: Fond du Lac Quadr., Neenah Quadr., 308*; Waterloo Quad., 75*; Winnebago Special Map, 389*
- Wisconsin R. Drainage Basin. R. Follansbee, A. H. Horton and R. H. Bolster, 948*; Lumber Rafting on. S. A. Sherman, 714*
- Witte, Baron J. de. Au Montenegro et en Albanie, 315*
- Witwatersrand, Geol. Map of portion of Lower — System on Central Rand, 956*
- Witzenhausen, Deutsche Kolonialschule in. Dr. M. G. Schmidt, 952*
- Wohlrabe, W. Wasserkräfte Frankreichs, 71*
- Wolf, F. W. De. State Geological Survey of Illinois, 916
- Wolkenhauer, W. Aus der Geschichte der Kartographie, 399*
- Wood-Jones, F. Coral and Atolls. Their History, Description, etc., *rev.*, 944
- Woodruff, E. G. Coal Field in S. E. Part of Bighorn Basin, Wyo., 152*; Lander Oil Field, Wyo., 948*; Map of Lander Oil Field, 706*; see also M. R. Campbell, *joint author*.
- Woodward, H. P. Geology and Ore Deposits of West Pilbara Gold Field, 638*
- Woolley, C. L., and D. Randall-MacIver. Karanög. The Romano-Nubian Cemetery, *n.*, 388
- Worcester, J. E. Modern Atlas to accompany Elements of Geography, Ancient and Modern (1819?), 800*
- Worcester, Mass., Geography of. R. M. Brown, 166
- Workman, W. H. Call of the Snowy Hispar, *rev.*, 929; Tongue of the Hasanabad Glacier in 1908, 225*
- World: ¶ Bevölkerung der Erde und ihre Verteilung nach dem Geschlecht. S. Gulischambarow, 559*; Commerce of the World in 1910, 860; Cosmos:

- Sketch of Physical Description of the Universe. A. von Humboldt, 320*;
 Geographical and Historical View of the World . . . With Notes . . . by Jedidiah Morse. J. Bigland, 239*;
 Habitable World Described . . . Including all the new Discoveries, etc., 1787-92. J. Trusler, 240*;
 International Map of, 317*;
 Nations of the Modern World. H. J. Mackinder, *n.*, 543;
 Vagabond Journey Around the. H. A. Franck, *rev.*, 216;
 Voyages to Various Parts of the World, and Remarks on Different Countries, etc. J. Willock, 240*
 ¶ Maps of World: Erdkarte der Ausbreitung der Pest am Ende des 19 u. Anfang des 20 Jahrhunderts. Dr. R. Pösch, *n.*, 473;
 Goode's Base Map, *n.*, 712;
 Isogonenkarte in besonderer Projektion. Dr. H. Maurer, *n.*, 799;
 Kautschuk-Weltkarte 1911, *n.*, 473;
 Map to show Azimuth and Distance from Tokyo, *n.*, 879;
 Gegen-azimutale winkeltreue Projektion. Prof. H. Mauer, *n.*, 552;
 Portion of Land Hemisphere showing Paleozoic land connections and paths of marine faunal migrations, 959*;
 Present distribution of genera *Acraea*, *Melanitis*, *Mycalesis* . . . in relation to late Paleozoic or Early Mesozoic Continent, 959*;
 Present Distribution of *Terias Catopsilia* and *Ampullaria* and of *Testacellidae* in relation to Equatorial Mesozoic Continent, 959*;
 Weltkarte der Erzlagerstätten. J. W. H. Adam, *n.*, 80;
 World's Telegraphic System, 1911, 959*;
 Three Charts representing: (1) Annual average isobars, isotherms of air, cold ocean currents, etc.; (2) Normal Wind Directions and Velocities for Jan. and Feb.; (3) — for July and Aug., 706*
 Worlds, Evolution of. P. Lowell, *n.*, 388
 Wright, F. E. Some Effects of Glacial Action in Iceland, 478*
 Wright, I. A. Cuba, *rev.*, 533;
 Nipe Bay Country-Cuba, 949*
 Wunder, L. Beobachtungen am Langjökull und im Thorisdalur auf Island, 226*
 Wyoming: ¶ Buffalo Coal Field. H. S. Gale and C. H. Wegemann, 313*;
 Coal Field in S. E. Part of Big-horn Basin. E. G. Woodruff, 152*;
 Eastern Part of Little Snake R. Coal Field. M. W. Ball and E. Stebinger, 474*;
 Lander Oil Field. E. G. Woodruff, 948*;
 Mineral Resources of — and Mining Laws of the State, etc. C. E. Jamison, 880*;
 Physiography of Bishop Conglomerate in Southwestern. J. L. Rich, 66*;
 133;
 Powder River Coal Field. R. W. Stone and C. T. Lupton, 151*;
 Salt Creek Oil Field. C. H. Wegemann, 948*;
 Southern Part of Rock Springs Coal Field. A. R. Schultz, 151*;
 Weathering of Coal in Arid Region of Green River Basin. A. R. Schultz, 151*
 ¶ Maps of Wyoming: Geologic Map of Sublett Mts., 229*;
 Lander Oil Field, with sections. E. G. Woodruff, 706*;
 Map showing Extent of Phosphate Reserve of, 229*;
 Prel. Geol. Map and Structure Section of Cokeville Area, 229*;
 Rock Springs Quad., 75*;
 Salt Creek Oil Field. C. H. Wegemann, 706*;
 Sheridan Quad., 874*
 Y.
 Yarkin or Pedee R. Drainage Basin, 475*
 Yalong (Chine), Dans les rapides du. Mgr. de Guébriant, 70*
 Yama Bay, Sea of Okhotsk, Chart, 799*
 Yamamoto, K. Guide to the Celebrated Places in Kiyoto and the Surrounding Places for Foreign Visitors, 560*
 Yangtse River (Yangtse-kiang): Beitrag zur Kenntnis der Fische des Jangtze und seiner Zuflüsse. Dr. Kreyenberg, 70*;
 Yangtse-kiang as Weltverkehrstrasse. Dr. G. Wegener, 870*
 Yap, The Peopling of. W. Churchill, 510
 Yate, Lieut. Col. A. C. The proposed Trans-Persian Railway, 717*
 Year Books: ¶ Geographisches Jahrbuch, 1910, *n.*, 705;
 Jahrbuch der Königlich Preuss. Geol. Landesanstalt zu Berlin, 1907-8, 558*;
 1910, 793*;
 Jahrbuch des Schweizer Alpenclub, 1910-11, 880*;
 New International Year Book. Compendium of World's Progress for 1910. Edited by F. M. Colby, 560*;
 New Zealand Official Year-Book, 1910, 792*;
 Statesman's Year Book for 1911. Ed. J. S. Keltie, 640*;
 Stat. Jahrbuch für das Grossherzogthum Baden, 1910-11, 800*;
 Year-book of Australia for 1911, 800*
 Yeld, G. Scrambles in the Eastern Graians, 320*
 Yellowstone National Park, Origin of Thermal Waters in. Dr. A. Hague, 553*
 Yenchu District, Map of Western, 877*
 Yenisei, Obi and — Gulfs. Chart

- compiled from surveys 1828-1909, 799*
- Yerba-Maté. Paraguayan Tea. A. Hale, 639*
- Yeu, L'Île d'— à travers les âges d'après la géologie, la cartographie et l'histoire. A. Pawlowski, 718*
- Yoe, S. The Burman, His Life and Notions, *rev.*, 305
- Yola-Cross River Boundary Commission, Southern Nigeria. Maj. G. F. A. Whitlock, 396*
- Yoruba, Nigerian Studies; or, The Religious and Political Systems of the —. R. E. Bennett, *rev.*, 460
- Yosemite: ¶Excursion to the —, or, Studies in the Formation of Alpine Cirques, "Steps," and Valley "Treads." E. C. Andrews, 553*; Hanging Valleys of the —. D. W. Johnson, 826, 890; Yosemite Trails. J. S. Chase, *rev.*, 923; Yosemite Valley: Its History, Characteristic Features, and Theories Regarding its Origin. G. Clark, *rev.*, 61
- Yosemite National Park, Administrative Map of. (U. S. Geol. Surv.) R. B. Marshall and A. H. Sylvester, *n.*, 77
- Young, G. A. Tobique District, N. B., 949*
- Young, R. E. Prince Edward Island, Nova Scotia and New Brunswick (Map), 78*; Western Canada (Map), *n.*, 77; Map of Ontario, Gowganda sheet, 77*
- Young, T. M. American Cotton Industry, 319*
- Younghusband, Sir Francis. The Cloud in Tibet. British Action and Its Results, 156*
- Yucatan: ¶Informe acerca de una excursión geol. prel. efectuada en el Estado de —. J. Engerrand and F. Urbina, 868*; Trip to Chichen-Itza, 868* ¶Map: Croquis Anexo al Informe acerca de una Exploración en el Estado de Yucatan, 634*
- Yukon-Tanana Region, Water Supply 1909. C. E. Ellsworth, 635*
- Yukon Territory: ¶Preliminary Memoir on Lewes and Nordenskiöld Rivers Coal District. D. D. Cairnes, 475* ¶Maps: Braeburn-Kynocks and Tantalus Coal Areas, 230*; Map of Boundary between British Columbia and — from Tatschenshini R. to Teslin Lake, *n.*, 231
- Yunnan: ¶Across Yunnan. A. Little, *rev.*, 210; Chemin de fer du. J. Rodes, 792*; Provincia dello Yunnan. D. A. Mazzolani, 637*
- Z.
- Zacatecas, Granodiorita de Concepción del Oro en el Estado de — y sus Formaciones de Contacto. Dr. A. Bergeat, 475*
- Zagorodsky, Dr. M. Banane und ihre Verwertung als Futtermittel, 952*
- Zahmen Kaiser, Plateau des (Map), 878*
- Zambezi, Falls of the. Wonders of the Mosi-Oa-Tunga. L. L. Seaman, 951*
- Zeeland, Zur Geschichte und Natur der Schelde-Mündungen in der Niederländischen Provinz —. F. Müller, 952*
- Zeitschrift des Deutschen und Österreichischen Alpenvereins, Jahrgang 1910, 560*
- Zeller, Dr. R. Forschungsreise von Dr. W. Volz in das Hinterland von Liberia, 154*
- Zemplin, Hungary. Map: Geol. Skizze des Zempléner Klippengebirges, 958*
- Zibans, Oasis des. A. de Claparède, 315*
- Zimbabwe, Mystery of. F. A. Edwards, 951*
- Zimmermann, E. Deutsche Tanganika-Njassa-Gebiet, 68*; Das heutige Katanga, 68*; Mines de cuivre du Katanga, 153*; Wirtschaftliche Entwicklung des südwestlichen Deutsch-Ostafrika, 315*
- Zimmermann, M. Antarctic Land of Victoria. From Voyage of "Discovery," 478*; Le Sahara Soudanais, 717*
- Zinder, Jonction du territoire de. Lieut. Detchebarne, 69*
- Ziz, Notes sur le Haut —. M. Oustry, 476*
- Zoëga, G. T. Concise Dictionary of Old Icelandic, *n.*, 213
- Zoogeography. See under Geography.
- Zugmayer, Dr. E. Afghanische Bahnprojekt, 155*
- Zuider Zee. Wat de Afsluiting en Droogmaking der Zuiderzee Eigenlijk Beteekent. A. A. Beekman, 639* ¶Map: Zuiderzee en haar Afwateringsgebied in Nederland, 234*
- Zwemer, Rev. S. M. Notes on Oman, 396*

ILLUSTRATIONS.

AMERICAN GEOGRAPHICAL SOCIETY

The New Home of the American Geographical Society: ¶ Broadway and 156th Street Fronts, facing p. 488; Broadway Front, facing p. 484; Editorial and Library Staff, 483; Drafting Room, 487; Main Hall, facing p. 486; Map Floor, 485; Office Floor, 482; South Front of the Building, facing p. 481; Stack Room, facing p. 486

AMERICA

California, Coast Ranges of —, Extension of the Known Area of Pleistocene Glaciation to the: ¶ Snow Mountain, Main Ridge about one-half mile southeast of —, Flat top, 167; Model of Snow Mountain, showing glaciated Valleys, 163; Striæ found on bed rock in glaciated valley of —, 165; Well-preserved Rhoches-Mountonnées in Valley F., Snow Mt., 166

Canadian Northwest, Exploring the: ¶ Green Lake Settlement, 186; Lac la Plonge, Banner oats at English Mission, 187; — Potatoes at English Mission, 189; — Sawmill at R. C. Mission, 187; Mt. Nebo, near Green Lake Trail, Farm at, 186; Stanley, Churchill River, Preston Wheat Field, 188

Hempstead Plains. Natural Prairie on Long Island: ¶ East Meadow Brook, Looking up slough at western edge of valley of, 357; — Looking up the valley of, 356; Hempstead Brook, Looking east across dry valley at — east of Garden City, 352; Hempstead Plains, Looking W. N. W. in dry valley near southeastern corner of, 353; Grove of Pitch Pine, Edge of small — in prairies about a mile southwest of Central Park, 359

Potosí: ¶ Cerro, Slopes of — Potosí in the Distance, 3; Market Place from the Roof of the Mint, 6; Potosí, Just outside of, 10; Llamas in the streets of, 11; Potosí Tin in Ingots, 8; View from the Prefect's Window in — showing both the old and the new Plaza, the Cathedral and the theatre, 4

Prince William Sound and the Southern Part of Kenai Peninsula, Alaska, Glaciers of: ¶ Kenai Peninsula, Glaciers of the Southern Coast of: Aialik Glacier, North side of front of, 731; Bear Glacier, East side of, 727; Ellsworth Glacier, July, 1909, 725; Holgate Glacier, Front of the,

731; McCarty Glacier, Central part of front of, 736; Northwestern Glacier, Eastern part of front of, 733; Northwestern Glacier, General View of, 734; Pedersen Glacier, North side front of, 731; Puget Glacier, July, 1911, 733; Thumb Cove, Resurrection Bay, Glaciers east of, 726 ¶ Prince William Sound. Glaciers of Port Wells: Baker and Detacht Glaciers, June, 1909, 333; Barry Glacier, Western side of trough, June, 1909, 331; Bryn Mawr Glacier, Aug., 1905, 329; Harrimap Glacier, June, 1909, 336; Harvard Glacier, Western part of front — showing its southernmost feeder, 328; Serpentine Glacier, June, 1909, 332; Surprise Glacier, June, 1909, 335; Toboggan Glacier, Aug., 1905, 337; Yale Glacier, East side of, July, 1909, 326; West side of front — July, 1909, 327 ¶ Prince William Sound, Glaciers of West Coast of: Bainbridge Glacier, Extreme north side of, 415; Front of, 414; Southern part of front, 416*; Blackstone Glacier, One of eastern ice lobes, 403; Central tide-water part of, 405; Western tide-water part of front of, 404; Chenega and Princeton Glaciers, 411; Moraine, Detail of the small, 409; Nellie Juan Glacier, Front of, 407; Nellie Juan Glacier, Bare Zone recently occupied by ice, small moraine and forest, untouched by last recorded advance of, 408; Tiger Glacier, 412

Superior Lake Region, Progressive Development of Resources of: ¶ Lake of the Woods on International Boundary, 662; Nipigon, Canada, Lake near, 564; St. Louis River, looking North, near Thompson, 666; Soo, The Rapids at the, 567

United States, Rice in the: ¶ Arkansas, Breaking ground for Rice in — along the "Cotton Belt Route," 502; Rice Mill at Stuttgart, Ark., Interior of, 508; Sacking Rice in Field, 507; Stuttgart, Ark., Rice Field Farm of S. H. Taggart, 506; Sunset Route, Harvesting Rice, 505; Waldenburg, Ark., Rice Field at, 593

Yosemite, Hanging Valleys of the: Yosemite Valley looking east, 836

Valley, A Small Hanging, 449

ASIA

Asia Minor, The Karst Country of Southern: ¶ Adalia, Wooded mountains near, 104; Bey Shehir Lake, 83;

Russian Village in, 98; Charshembek, The gorge of — showing dense vegetation, 99; Kara Baulo, in the forested area near Adalia, Turkish peasants among the seats of Council Chamber, 103; Phrygia, Fantastic cliffs of volcanic tuff in, 92; A Greek tomb in —, carved originally to simulate a portico with columns, 96; Sink-hole in the limestone country where the water disappears underground, 97; Spring where Appollo flayed Marsyas, 101

Chehkiang, China, Northeastern —: Notes on Human Adaptation to Environment: ☞ Bridge showing Span composed of Long Slabs of Stone. Si-hu, or West Lake in the background, 812; Chinese Junk showing Sticks of Bamboo used to flatten the sail, 820; Duck-herd with Ducks, 809; House made of Bamboo Matting, 821; Water Buffalo, Ploughing with, 815

Taal Volcano, Luzon, Eruption of: ☞ Bañadero, Eruption Cloud as it Appeared from — Jan. 30, 1911, 908; Lemery, Fissure in town of, 911

EUROPE

Iceland, Physiographical Features of: "Balder's Bra, *Bellis perennis*, dense

mass near the Shore of a Fiord, 497; Grimstungaheithi, Characteristic Moraine, 493; Hytá, Water Flowing out of the Lava into the Canyon of the, 499; Krafla, General View of a Portion of Solfatara near the Base of, 496; Oxnadalr Pass, Midsummer in the. Typical Farm, 491; Mývatn, showing Crater Islands with Krafla in the Center, 492; Reykholt, Geyser in the Center of Glacial Stream near, 495

Land Reliefs that are True to Nature: ☞ Matterhorn, Naturalistic Model of the, 420

OCEANIA

Land Reliefs that are True to Nature: Bora Bora Model, Photographs of central portion, 422

POLAR REGIONS

Antarctic Explorations, Charcot's: ☞ Alexander I Land, 85; Pushing into the Floe Ice off, 83; Alexander Land as seen from the North, 89

Jan Mayen Expedition of 1911: Driftwood Bay, Entrance to, 883; Iceland, Sunlight through the rifted fog lying low off the east of, 887; Jan Mayen Coast, General Character of, 884; Traill Cape, 886

MAPS, DIAGRAMS, AND PROFILES

AMERICA

American Slavery, Geographic Influences in: ☞ Coastal Plain, Section across the — from the Piedmont to the Gulf in Central Alabama, 172; Cotton Belt, Map showing principal Divisions of — east of the Mississippi in Alabama and Mississippi, 171; Graphs showing Data from the Belt shown in Fig. 18, 174; Greenville, Tenn., Eastern Part of Ridge Belt, Profile showing Section near, 15; Louisiana, Map showing production of sugar in, 1860, 177; Map, 14; Maps to show Average Temperatures, 18, 19, 20, 21, 22, 23; Maps to show Number of Slaves in Thousands, facing p. 180; Mississippi Lowlands, Sketch Map of the, 175; Mississippi Lowlands and Loess Bluffs, Soil Map and Profile of a portion of, 176, Soil section and slavery factors on the, 178; Nashville Basin, Profile, Section and Graphs of southern part of, 16; North Carolina, the Coast of, 25; Number of Slaves in Thousands, 113;

Percentage of Slaves to Whites, Diagram, 107; Sea Island Coast of South Carolina and Georgia, Map, 110; Sea Islands and their characteristic soils near Charleston, S. C., 111; South Carolina and Georgia, Principal Regions of, 112; Tennessee Valley in Alabama, Section across the, 173; Texas, Cotton production, 1900, and main soil belts of, 180; Tobacco South, Map showing distribution of the principal crops of the — in 1840, 108; Virginia and West Virginia, Generalized Profile and Section across, 109

Cleveland Normal School, Geographical Department of, 454

Michigan, Establishment of Boundaries: ☞ Erie and Michigan Lakes, Relative position of, 343; Michigan and Wisconsin, Supposed boundary between — 1838, 346; Michigan and Wisconsin, Boundary between —, as corrected by Capt. T. J. Cram, 1842, 349; Mitchell's Map of —, 1755, 341; Territory over which the jurisdiction

- of Michigan extended — 1805, 1818, 1834, 340
- New York, Railroad Distances in: ¶ New York, Railroads of, 28; Distance from R. R. Station, 29
- North America, Pleistocene Glaciation of: ¶ Continental Glaciers, Map to show the position of the existing — which develop the excentric wind poles above the earth's surface, 649; — of Greenland and Antarctica, Profiles across the margins of the, 651; — of Pleistocene time, Map to show the position of — and the wind poles of the earth for the same time, 656; Diagram to show different layers of the lower atmosphere as determined by international observations with the use of sounding balloons, 648; Glacial Anticyclone, Diagram to show the position of — above a continental glacier, 647; Greenland continental glacier, Profile in natural scale of the, 643; Ice-cap in Iceland, Shield-like profile of, 645; Sand dunes formed by winds of Pleistocene time, Map to show Orientation and distribution of, 657
- Prince William Sound and the Southern Part of Kenai Peninsula, Glaciers of: ¶ Kenai Peninsula: Aialik Bay, Map of upper part of, 729; Bear Glacier, Map of front of —, 727; Ellsworth Glacier, Map of, 724; Harris Bay and Northwestern Glacier, Sketch map of, 732; Kenai Peninsula, Map of southern part of — showing coastal glaciers, 722; McCarty Glacier, Map of front of, 735; Puget Glacier, Map of, 723; Thumb Cove, Resurrection Bay, Sketch Map of glaciers east of, 726 ¶ Prince William Sound: Map of northwestern part of, July, 1909, 322; Bainbridge Glacier, Map of the front of, 413; Blackstone Bay, Map of, 402; College Fiord, Map of — July, 1909, 323; Harriman Fiord, Map of the upper part of —, June, 1909, 330; Ice Bay, Map of, 410; Port Nellie Juan, Map of, 406
- São Paulo, Economic Climatology of the Coffee District of: ¶ Map of the Coffee District in, 429
- Superior Lake Region, Progressive Development of Resources in the: ¶ Great Lakes, Movement of Coal on, 570; Great Lakes, Movement of Grain and Flour on, 566; Great Lakes, Movement of Iron Ore on, 565; Map to show decrease in lumber shipments, 1897-1907, 660; Soo, The Rapids, Canals and Locks at, 568; Superior Lake, Sketch Map of — Region showing Iron Districts and Lines of Transportation, 563
- United States, Rice in the: ¶ Map of Rice Cultivation in the, 1910, 501
- Yosemite, Hanging Valleys of: ¶ Illilouette Falls. Showing notch due to weathering along joint planes, 901; Sketch Map showing Relation of the Yosemite and other Similar Valleys to Their Glacial Drainage Basins, 892; Profile, 828; Vernal and Nevada Falls, 902; Yosemite Falls, 900
- ### ASIA
- Chehkiang, Northeastern: Notes on Human Adaptation to Environment, Map of northeastern Chehkiang, 802
- Taal Volcano, Eruption of: ¶ Map of Part of Southwestern Luzon showing Area Covered by Mud from the Eruption, 905
- ### EUROPE
- Iceland, Physiographical Features of: Map Illustrating Mr. Russell's routes in, 490
- ### POLAR REGIONS
- Antarctic Explorations, Charcot's: Carte provisoire de l'Antarctique Sud-Américaine, facing p. 81
- Jan Mayen Expedition of 1911: Map of — based on the map of Austrian Expedition of 1882-83, 882
- ### GENERAL
- Land Forms, Notes on the Description of. Profiles, 852, 853
- Nations, The Culture of: ¶ American Countries, Comparative Diagram of Indices of — for schooling, commerce, railroads and mails, 261; Commerce, Showing Total General Commerce per Capita, 251; Culture, Indices for Schooling, Railroads, Commerce, etc., 245; European Countries, Comparative Diagram of Indices of — for schooling, commerce, railroads and mails, 243; Inhabited World, 1905, 244; Mails, Shows Number of Pieces of Mail delivered annually per capita, 255; Railroads, Shows Number of Miles of Railroad per 100 square Miles, etc., 254; Schooling, Percentage of Population at elementary Schools, 250
- ### PORTRAIT
- Palmer, Nathaniel B., facing p. 282

